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Infant Feeding Practices In Saskatchewan

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INFANT FEEDING PRACTICES IN SASKATCHEWAN

Prepared by:
C. Ann Kilcher
Graduate Student
Faculty of Education
University of Regina

In Conjunction with:
Lynn Harasym
Provincial Nutritionist
Saskatchewan Health

Joanne Havelock
Policy Research and Management Systems
Saskatchewan Health

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ABSTRACT

A survey of infant feeding practices was conducted in Saskatchewan during November 1980. Questionnaires were mailed to 1976 mothers in order to monitor infant feeding practices at six weeks, three months, six months, and twelve months of age. The final sample included 1342 Saskatchewan married mothers and their infants, 68% of the sampled population. Data was obtained on specific aspects of infant feeding practices and demographic information of the sample. The relationship of specific practices to selected factors was examined by chi-square analysis to isolate variables significant and independently related to the incidence and duration of breastfeeding, as well as the age of introduction of solid food. The results were summarized according to the five topics studied: breastfeeding, alternate milk feeding, solid food, vitamin and/or mineral supplementation, and source of nutrition information.

Seventy-seven percent of the women sampled initiated breastfeeding. At six weeks, 63.3% continued to breastfeed. This percentage had decreased to 53.8% by three months and 39.3% at six months. Twelve percent of the women were still breastfeeding at twelve months. The mean age of cessation was approximately 14 weeks. Personal reasons, problems with the infant, and milk supply were the three most frequently and consistently cited reasons for cessation.

Mother's education level, prenatal class attendance, parity, breastfeeding experience, and rooming-in were significant ($p < .01$) factors related to the initiation of breastfeeding. No significant differences were found between family income levels, mother's age levels, place of residence,or sex of infant. The duration of breastfeeding was significantly ($p < .01$) related to mother's age and education level, parity, and breastfeeding experience. Family income level, place of residence, prenatal class attendance, sex of infant, and rooming-in practice were unrelated to the duration of breastfeeding.

Twenty-three percent of mothers chose to feed their infants some alternative form of milk from birth. Commercial formula was the main alternative to breastmilk for the first six months of life. The use of modified commercial formula (Prosobee, Soylac, Nutramigen, Isomil) increased over the first year of life. Whole and 2% milk were introduced early. Approximately 5% of three month old infants were receiving these two kinds of milk. By six months, 18.3% of infants were consuming whole milk and 16.3% received 2% milk. At twelve months, 35.6% of the infants were consuming 2% milk as their main form of milk. Very few infants received home-prepared formulas, skim or goat milk.

Solids were introduced early. By six weeks 26.7% of infants had been introduced to solid food. Fifty-five percent of infants were consuming solids at three months, while 96.8% of six month old infants were receiving solid food. The average age of solid introduction was 12 weeks. The main first foods offered were infant cereal and fruit juice. Fruits were introduced before vegetables. The majority of the infants received home-prepared baby food. Eighteen percent of infants had salt added to their food and 27.2% of infants had sugar added to their food.

Family income, mother's age and education level, as well as breastfeeding experience, breastfeeding duration, and type of milk feeding proved to be significantly ($p < .01$) related to the age of introduction of solid food. Non-significant factors were place of residence, prenatal class attendance, parity, and sex of infant.

Vitamin and mineral supplementation was widespread. Sixty-eight percent of infants in the study were receiving either vitamins and/or minerals. Supplementation increased over the first year. Trivisol was the supplement most frequently given and Triviflor was the second most frequently cited supplement. Most infants being given supplements received them once a day. Some infants consuming commercial formulas were receiving unnecessary supplements while a number of breastfed infants were not receiving recommended supplements.

The majority of the mothers (67.4%) surveyed received a copy of Saskatchewan Health's infant nutrition publication, "Caring is ... the right food at the right time." Most mothers received the pamphlet from a public health nurse or the hospital while the other mothers obtained it from the doctor, nutritionist, or dietitian or some other source. Overall,

the pamphlet is very well received and 87.4% of the women found it valuable. Comments regarding the pamphlet were generally of a positive nature. Some areas of conflict were identified, some suggestions for additions were indicated.

The comments and questions made by mothers fell into ten categories including: solids, breastfeeding, feeding times, bottlefeeding, allergies, problems, supplementation, food preparation, health professional advice, and other. The number and nature of the comments and questions seems to indicate the need for education programs on infant feeding for mothers. A variety of approaches to provide mothers with information need to be investigated. Responses also suggest that mothers need support and guidance during the child's first year.

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CHAPTER I

INTRODUCTION

Nutrition is important to the general health and well-being of persons of all ages but is perhaps most significant during infancy and the early years of childhood. During the first year of life, growth is faster than at any other postnatal age and as such, infancy is a critical period of development. Many reports indicate that in well nourished children, susceptibility to infection and severity of illness is significantly less than in those who are malnourished. Undernutrition and overnutrition during infancy may determine later size of the body and its component parts as well as contribute to potential health problems. Although many causes contribute to high infant mortality and ill health, inadequate or improper feeding appears to be the most prevalent determinant of infant well-being. Therefore, optimal nutrition is especially important during the first year of life.

Infants are dependent on others for the care that will mean their physical survival and growth. Those significant others in the life of an infant are in most cases the parents of that infant, in particular the mother. If parents are to properly care for and provide optimum nutrition for infants, they must be provided with a solid base of information. Nutrition education to advise parents on infant feeding must be based on an understanding of present practices and of the factors influencing those practices.

Background

In order to keep health professionals in Saskatchewan up to date on the various aspects of infant feeding to provide optimum nutrition for the first twelve months of life, Saskatchewan Health put forth their recommendations on infant feeding. During January 1979, two publications on infant feeding were made available: a manual for health professionals, "Infant Nutrition: A Manual for Health Professionals" and a pamphlet for the general public, "Caring is ... the right food at the right time."

Apart from a breastfeeding survey conducted in three health regions in 1977, there is little information available regarding actual feeding practices in Saskatchewan and no information that would indicate the extent to which recommendations set out in 1979 were being followed by mothers of infants in the province.

In order to obtain a greater understanding of current infant feeding practices in Saskatchewan, a major survey was undertaken. A questionnaire was developed to gather information on specific infant feeding practices including breastfeeding, other milk feeding, introduction of solid food, vitamin and mineral supplementation, source of nutrition information, and factors influencing those practices.

Purpose of the Study

The purpose of this study was to construct a data base of information on infant feeding practices in Saskatchewan. The primary task was to describe the specific aspects of infant feeding practices of married Saskatchewan mothers and investigate some factors that influence those practices. This analysis of present practice would identify those areas of infant feeding that should be focused on in further education efforts as well as provide a basis for future comparative studies and program evaluation.

A second purpose of the study was to gather some information on the prenatal status of the mother and infant birthweights. These results are presented in a supplementary report entitled "Prenatal Experience and Pregnancy Outcome" (Saskatchewan Department of Health, 1983).

Thus the objectives of the study were four:

1. to describe infant feeding practices in Saskatchewan and to investigate some factors that influence those practices.
2. to identify those areas of infant feeding that should be focused on in further health education and promotion efforts.
3. to establish a data base for future comparative studies and program evaluation.
4. to gather some prenatal information and to monitor infant birthweights.

Importance of the Study

Apart from a 1977 breastfeeding study conducted in three Saskatchewan Health regions, there is little data on infant feeding practices in Saskatchewan. This paucity of dietary information for the very young infant has made it difficult to evaluate concerns related to infant nutrition and in turn to plan further health education and promotion efforts. Identification of specific infant feeding practices will alert health professionals to the need for education and support regarding particular aspects of infant nutrition.

In the view of the scarcity of information and research in this area in Saskatchewan, it was felt that information yielded by this survey could conceivably prove to be of value in:

1. providing direction for health professionals in Saskatchewan so that maximum support through counselling and health education can assist mothers in feeding their infants.
2. determining the specific focus and emphasis needed for future resource material preparation and publication as well as health promotion efforts.
3. determining sources of infant nutrition information used by mothers to identify the most effective channels of information distribution.
4. helping health professionals identify those mothers to whom programs should be aimed to improve the nutritional status of infants.

The information gained from this study has potential implications for a number of groups of people. Nutritionists represent one group as results of the survey should provide direction and focus for program planning and a basis for further comparative analysis. A second potential interest group includes other health professionals as findings should identify appropriate aspects of infant feeding for counselling and specific practices in need of change. Mothers make up a third target population for the study results. Information collected will make them aware of current infant feeding practices and hopefully, in turn, improve those practices. The final group that this study has implications for is infants as perhaps they will benefit from more optimal feeding practices as a result of outcomes of the analysis.

In Appendix A, a number of terms are defined for the purposes of this study.

CHAPTER II

LITERATURE REVIEW

Infant feeding practices have been undergoing a dramatic process of reappraisal in the past 5 to 10 years (Jelliffe and Jelliffe, 1981). There has been a great deal of interest in the diets of infants and how nutrition affects behaviour, attitudes, cognitive development, and physical growth. As a result, emphasis has been given to the long-term effects of overfeeding, nutritional imbalance, and early eating habits on the health of adults. Position papers and reports released recently by health professionals hvae presented recommendations and a number of nutrition education resources have been developed by various provinces (Alberta, 1981; British Columbia, 1978; Manitoba, 1980; Nova Scotia, 1979; Ontario, 1978; Prince Edward Island, 1978; Saskatchewan, 1979, 1981a) to provide guidance on infant feeding practices.

This chapter presents the recommendations for the nutritional management of infants, the rationale supporting each recommendation, and reviews recent studies on infant feeding practices. The relevant literature is reviewed in a topical fashion according to those specific aspects of infant nutrition being studied - breastfeeding, alternate milk feedings, solid foods, vitamin and mineral supplementation.

Breastfeeding

Recommendations

The Canadian Paediatric Society, Nutrition Committee (1980) recommends breastfeeding as the optimal method of feeding for all full-term newborns except in the few instances where specific contraindications are present. Ideally, breastmilk should be the only source of nutrients for most infants for the first four to six months of life. Support for this recommendation is provided by Canada, Department of Health and Welfare (1980), the Canadian Home Economics Association (1979), Fomon, Filer, Anderson and Ziegler (1979), National Dairy Council (1980), and WHO (1979). The

Saskatchewan Department of Health (1979, 1981a) endorses these recommendations as well.

Rationale

Breastfeeding is considered to have definite advantages over other modes of feeding. Four main reasons are advanced in support of breastfeeding: 1) breastmilk is species specific, providing optimum nutrition for the human infant; 2) provides immunological protection against infection; 3) protects against allergies, and 4) facilitates maternal-infant bonding.

Species Specific. It is argued (Canadian Paediatric Society, 1978; Gerrard, 1974b; Jelliffe & Jelliffe, 1977; Rolles, 1976) that milk of each species is especially adapted to the particular needs of that species. With the exception of vitamin D, human milk provides a total nutrient source for the normal, healthy infant for the first four to six months of life. During this time, breastmilk provides adequate amounts of proteins, fats, and calories tailored to the needs of human growth (Canada, Department of Health and Welfare, 1980). The comparative properties of human milk and artificial formulas are considered in two detailed statements that were issued by the Canadian Paediatric Society, Nutrition Committee in 1978 as well as by others (Baggot, 1978; Jelliffe & Jelliffe, 1978; Spady, 1977).

Immunological Benefits. Apart from nutrient quality, breastfeeding also confers on the young infant immunological benefits which are not obtained in any other mode of feeding. There is increasing evidence that the newborn is dependent on breastmilk for the acquisition of certain important elements of host resistance while maturation of his own immune system takes place (Gerrard, 1974b). The human breast secretes antibodies to some intestinal micro-organisms which help protect breastfed infants from enteric infections (Goldman & Smith, 1973; Mata & Wyatt, 1971). The specific immunological benefits provided by breastfeeding are discussed at length by a number of writers (Addy, 1976; Breastfeeding, 1976; Canadian Paediatric Society, 1978a, b; Cunningham, 1977; Ellestad-Sayed, Coodin, Dilling & Haworth, 1979, Gerrard & Tan, 1978; Goldman & Smith, 1973; Mata & Wyatt, 1971; Schaefer, 1971).

Decreased Allergic Response. Breastfeeding has also been linked with decreased infant allergic manifestations. Recent research (Gerrard, MacKenzie & Goluboff, 1973; Eastham, Lichauro, Grady & Walker, 1978) shows that breastfeeding has a protective effect against cow's milk protein in infancy. Evidence also suggests that allergies such as eczema and asthma are less prevalent in breastfed infants (Blair, 1977; Matthew, Taylor, Norman, Turner, Soothill, 1977). Thus for infants with a family history of allergy, breastfeeding is recognized as an important preventative measure. Allergies, their manifestation, identification, and mangement are detailed by Gerrard (1979a).

Maternal-Infant Bonding. Breastfeeding also tends to promote the development of a very strong mother-child bond. Early and prolonged body contact between a mother and her infant is an important factor in maternal-infant bonding and in the development of a mother's subsequent behaviour to her infant (Klaus and Kennell, 1976; Newton, 1971). The unique mother-infant interaction and opportunity for bonding promoted by breastfeeding are considered to be another important advantage.

Current Breastfeeding Practices

The popularity of breastfeeding fell markedly during this century. A number of writers (Coles, 1977; Fomon, 1975; Jelliffe & Jelliffe, 1981; Myres, 1979; and Nutt, 1979) report on the decline of both the frequency and duration of breastfeeding which began approximately 50 years ago in industrialized society. In the past ten years, however, there has been a dramatic rise in interest and concern with the practice of breastfeeding. Several studies carried out in Canada, the United States, and England over the past few years document the resurgence of breastfeeding.

Data from the 1960's and early 1970's in Canada (Myres, 1979) suggest that very few infants were breastfed in the first few months of life. The Nutrition Canada Survey conducted in 1970-72 shows that the incidence as well as duration of breastfeeding across Canada was relatively low. Only 16 of 250 infants surveyed were being breastfed: 2 under one month; 7 in the one to two month category; 4 in the three to five month category, 1 in the six to eight month category; and 2 in the nine to eleven month category (Canada, Department of National Health and Welfare, 1977). Similar breastfeeding levels were reported in the United States (Fomon, 1975; Maslansky, Coswell, Carol, Berman & Grossi, 1974; Martinez & Nalezienski, 1981; Riveria, 1971) and England (Overfeeding, 1973; Shulka, Forsyth, Anderson, Merevah, 1972) in the early seventies.

More recent studies in Canada have reported higher levels of breastfeeding in most regions. Escott (1976) reported that 61.2% of women surveyed in the Halton Region of Ontario attempted breastfeeding. However, this percentage decreased to 30% by six weeks and to 17.5% by three months while only 10% of the mothers breastfed longer than six months.

A Saskatchewan survey conducted in 1977 indicated that 58% of the mothers in three health regions breastfed one or more times. By six weeks, only 41% of the mothers were still breastfeeding,and this percentage decreased to 31% by three months. Eighteen percent of the study population continued to breastfeed for more than six months (Bergerman, Misskey & Thompson, 1979).

Recent studies in Manitoba show similar results. Clark and Beal (1982) found 58% of Manitoba mothers surveyed had initiated breastfeeding. This decreased to 45% at one month; 35% at two months, and 28% at three months. Haworth and Kemp (1979) found similar results in a second survey also conducted in Manitoba during 1979. Fifty-seven percent of the mothers in their study chose to breastfeed initially. Of these, 32.1% and 26.6% were breastfeeding at two months and six months respectively.

Yeung (1980) found that 71% of mothers surveyed in Montreal and Toronto breastfed their infants during the first week of life. Fifty-eight percent were still breastfeeding at one month; 40% at three months, 21% at six months, and 5% at twelve months. The mean duration of breastfeeding in this study was three and one-half months.

Although it appears breastfeeding is increasing in Canada, its popularity is still low in the Atlantic region. Alton-Mackey and Orr (1978) reported that only 17% of mothers in a study conducted in Newfoundland breastfed after leaving the hospital and Seamen (1978) found that only 23% of the women surveyed in Prince Edward Island had initiated breastfeeding.

Despite the low prevalence of breastfeeding in the Atlantic region, it is apparent from the results of other recent studies in Canada that levels of breastfeeding are higher but that breastfeeding tends to be of short duration.

This trend has been documented in the United States as well. Andrew, Clancy and Katz (1980) reported that only 26% of infants in a study carried out in New York initiated breastfeeding and no infants were receiving human milk at four months. Comparison of survey results conducted over a series of years by Ross Laboratories indicated that approximately 24.7% of infants in 1971 were breastfed while in hospital compared to 49.7% in 1979. At five to six months only 5.5% of infants in 1971 continued to be breastfed whereas 23% of infants were still breastfed at this time in 1979 (Martinez & Nalezienski, 1981).

Reasons for Termination of Breastfeeding

The number of reasons for the termination of breastfeeding are many and varied. Determination of the specific reason for discontinuation provides an understanding of the incidence of problems women experience and subsequent direction for counselling and education programs to encourage the duration of breastfeeding.

Bergerman and colleagues (1979) found that a strong relationship existed between the incidence of problems encountered and the duration of breastfeeding. A comprehensive list of reasons for termination were identified by these researchers. The reason most frequently cited that caused mothers to discontinue was "not enough milk." Personal reasons and breast problems were two other major reasons given. Clark and Beal (1982) also found that a poor or inadequate milk supply was the reason given most often during the first month for weaning. However, if a mother weaned after one month, the reasons were more likely to be of a personal nature.

A study conducted in Boston (Coles, 1977) reported three major reasons for cessation of breastfeeding: 1) "not enough milk;" 2) "I always felt tired;" and 3) "baby's doctor told me to stop." Barnes and Barnes (1976) reported the following reasons for termination: 1) unable to establish lactation; 2) baby's poor sucking reflex or dissatisfaction; 3) lack of help and support; 4) mother's lack of interest; and 5) a predecided intention to stop. Many of these reasons are discussed by Nutt (1979) as well.

A review of the literature indicates a wide variety of reasons for the termination of breastfeeding. These reasons can be grouped into the following categories: 1) milk supply; 2) breast problems; 3) personal; 4) infant-centered; 5) medical; 6) weaned, and 7) other. Identification of the reasons why mothers stop breastfeeding has suggested the need for education and support on the part of health professionals.

Factors Affecting Breastfeeding

Researchers have identified a number of factors that affect the prevalence and duration of breastfeeding.

Prenatal Class. Knowledge of breastfeeding, in particular, knowledge of the practical management and physiology of feeding are suggested to influence the duration of breastfeeding (deChateau, Holmberg & Jackson, 1977; Eastham, Smith, Poole & Neligan, 1976; Ladas, 1970, 1972; McKean, Baum & Sloper, 1975). Prenatal classes provide one source of information for expectant mothers. Several researchers have investigated the influence of prenatal classes on the incidence and duration of breastfeeding.

In a study of Thordarson and Costanzo (1976), 75% of the mothers who breastfed attended prenatal classes, while only 45% of the non-attenders breastfed their infants. A questionnaire was administered by the public health nurse, usually within the first two weeks of birth. Since this is such a short time after birth, it does not measure the impact of prenatal classes on the duration of breastfeeding.

Clark and Beal (1982) also found a higher incidence of breastfeeding among women who attended prenatal classes. Seventy-three percent of mothers who attended classes breastfed, a much higher proportion than that of mothers who did not attend classes (43%). A study conducted by Davis and Morrone (1962) reported that preparation by prenatal classes did not significantly increase the number of mothers who nursed their infants.

Mother's Age. Mother's age has been identified as another factor influencing breastfeeding practices. More older mothers tend to breastfeed than their younger counterparts. Bergerman et al. (1979) found that women in Saskatchewan 20 years of age or younger breastfeed for the least amount of time (usually less than 6 weeks) whereas mothers aged 31 to 35 years tended to breastfeed for the longest duration.

Clark and Beal (1982) reported that the proportion of mothers in Manitoba who were breastfeeding increased significantly ($p < .01$) as maternal age increased. Seventy-one percent of the mothers in their study over 30 years of age and 78% of those over 35 were nursing whereas only 39% of women under 20 years of age were breastfeeding.

Both Armstrong-Monahan (1980) and Escott (1976) found that older women, 25 years or more, continue to breastfeed longer than younger women as well. Sacks, Brada, Hill, Barton and Barbard (1976) also reported that maternal age was an important factor related to breastfeeding and found that there was a tendency for mothers who breastfeed to be older.

Education Level. Mothers with higher levels of education are reported to be more inclined to breastfeed their infants and for longer duration than those with less education. Clark and Beal (1982) reported that as the level of education increased, so did the proportion of breastfeeding mothers. In their study, a very high proportion of university graduates breastfed their infants. Other studies (Andrew et al., 1980; Bergerman et al., 1979; Escott, 1976; Jelliffe & Jelliffe, 1981; and Sacks et al., 1976) report similar findings. In all cases, a higher incidence of breastfeeding occurred among those women with post-secondary education.

Family Income Level. Social class and income level are two variables which affect breastfeeding as well. Sleigh and Ounsted (1975), Dixon (1980), Escott (1976), and Armstrong-Monahan (1980), report that a higher proportion of women in the upper social classes initiate breastfeeding and continue for a longer period of time than women in lower social classes. Fomon (1975), Riveria (1971), Martinez & Nalezienski (1981), and Clark and Beal (1982) also found the highest incidence of breastfeeding occurring among those women with higher incomes and that women in the lowest income families are less likely to breastfeed. Results of a study in England by Sacks et al. (1976) showed that breastfeeding was more common in families of non-manual workers.

Place of Residence. Alton-Mackey and Orr (1978) found differences in the infant feeding practices of metropolitan, urban, and rural mothers in Newfoundland. Twenty percent of the metropolitan sample and 16% of the urban sample were breastfeeding; whereas only 6% of the rural sample were breastfeeding. These results differ from the findings of Clark and Beal (1982) where the highest prevalence of nursing occurred among women who lived in small towns and on farms. Haworth and Kemp (1979) reported no significant differences in the incidence of breastfeeding between Winnipeg and rural areas.

Parity. Haworth and Kemp (1979) reported that more primiparous mothers (62.5%) chose to breastfeed than multiparous (52.2%) mothers. Similar findings were documented by Clark and Beal (1982) as well as in England by Kirk (1978) and in the United States by Martinez and Nalezienski (1981).

Breastfeeding Experience. Mother's experience and knowledge about breastfeeding has been identified as a factor influencing the incidence and duration of breastfeeding as well. Mothers who have breastfed before tend to breastfeed longer than mothers with no experience (Bergerman et al., 1979; Clark & Beal, 1982). Andrew (1980) found that the mother's knowledge about breastfeeding was positively related to the decision to breastfeed.

Infant Sex. The sex of the infant was shown as an influencing factor in breastfeeding duration by deChateau et al. (1977). Male infants were found to be breastfed longer than female infants. This finding was not supported by Armstrong-Monahan (1980).

Rooming-in. "Rooming-in" refers to the practice of having the newborn in the hospital room with the mother at all times. Early hospital experiences have been deemed important in determining whether mothers will succeed in establishing satisfactory breastfeeding (Coles, 1977; Culley, Milan, Roginsh, Waterhouse & Wood, 1979). Breastfeeding is incompatible with many hospital routines, since it should commence as soon as possible after birth and continue on a demand basis if lactation is to be established and maintained.

"Rooming-in" practice during the hospital stay was found to be significantly related to the actual duration of breastfeeding by Coles (1977) in a study conducted in Boston. Two-thirds of the women still breastfeeding at the time of the survey had "rooming-in" arrangements, whereas more than one-half of the group who had stopped breastfeeding had not had their infants with them in their room.

Clark and Beal (1982) found a significantly ($p < .005$) higher prevalence of nursing mothers in hospitals that encouraged "rooming-in." Approximately 67% of mothers in hospitals encouraging "rooming-in" were breastfeeding compared to 53% of mothers when the hospital did not encourage this practice. Armstrong-Monahan (1980) did not find that "rooming-in" practice affected the outcome of breastfeeding.

Alternate Milk Feedings

Recommendations and Rationale

When breastfeeding is unsuccessful, inappropriate, or discontinued early, commercial formulas are recommended as a more satisfactory substitute for breastmilk than any other product as they most closely resemble the composition of breastmilk (Canada Health and Welfare, 1980; Canadian Paediatric Society, 1980).

Whole milk and evaporated milk formulas are also recognized as suitable alternatives for infants providing the fat, protein, and carbohydrate content of the milk is modified more closely to resemble that of human milk. Appropriate modifications are outlined by McKeith and Wood (1977). Goat milk is another alternative that is commonly used for infant feeding in many parts of the world. Its composition is similar to that of whole milk and therefore, with appropriate modification, can be used for infants.

Formula serves as a reasonable alternative to breastmilk and should be given to those infants not receiving breastmilk for at least the first six months of life and preferably the first year of life.

Unacceptable Milk Feedings. Unmodified whole milk is unacceptable until at least six months of age because the balance of fat, protein, and carbohydrates is unsuitable for the infant's needs. It should not be given until the infant is consuming approximately 250 ml of solid food (six to nine months of age), and preferably not until one year of age (McKeith and Wood, 1977).

Two percent milk is not recommended for children under 18 months of age and skim milk is not recommended for those under two years of age. These two milk feedings provide total caloric and fat intakes that are undesirably low while protein and lactose intakes are undesirably high. They also have high levels of electrolytes resulting in a very high solute load (Spady, 1977). With respect to skim milk, considerable evidence exists in the literature suggesting that the feeding of skim milk early may be harmful to the growth and development of the child (American Academy of Pediatrics, 1974; Fomon et al., 1973; Spady, 1977).

Current Milk Feeding Practices

Although breastfeeding is experiencing increased popularity, widespread use of formula and other milks is still evident despite the challenge put forth by a number of investigators (Gerrard & Tan, 1978;

Jelliffe & Jelliffe, 1977; and Rolles, 1976) that human milk cannot be duplicated. Data from the 1960's and early 1970's in both Canada (Myres, 1979) and the United States (Fomon, 1975; Martinez & Nalezienski, 1981; and Riveria, 1971) suggest that approximately 75% of infants were fed various forms of milk from a bottle.

A high incidence of formula feeding was reported in the Nutrition Canada Survey conducted in 1970-72. Sixty-eight percent of the infants three months of age were being fed formula, of which 71% was commercially prepared. There was a marked trend towards the greater use of whole milk and evaporated milk in lower income groups. In the older groups, the consumption of formula decreased (Canada, Department of National Health and Welfare, 1977). Fomon (1975) reported similar trends in the United States.

Recent reports indicate that although a decrease in the feeding of milk other than breastmilk is evident the incidence is still undesirably high and that there is regional variation in Canada.

A Saskatchewan survey conducted in 1977 showed that 42% of the mothers chose to bottlefeed from birth and that approximately 58%, 69%, and 82% were being fed other forms of milk at six weeks, three months, and six months respectively. Results from a Manitoba study by Haworth and Kemp (1979) show a similar increase: 43.5% of infants were initially bottlefed while 67.9% and 78.4% were consuming other forms of milk at two months and six months. Clark and Beal (1982) also reported that infants were not being breastfed for a long duration and thus were receiving formula or some form of cow's milk. As was reported by Haworth, 42% of infants in this second Manitoba study were bottlefed from birth with this percentage increasing to 55% at one month, 65% at two months, and 72% at three months.

Escott's (1976) results from Ontario document similar findings. Thirty-nine percent of the mothers in that study initially bottlefed with the consumption of milks other than breastmilk increasing to 69.9%, 82.4%, and 89.9% at six weeks, three months, and six months respectively.

Alton-Mackey and Orr (1978) found the majority of the mothers (83%) were not breastfeeding on leaving hospital. A survey conducted in Prince Edward Island (Seamen, 1978) also found that a large percentage of infants (77%) received alternate forms of milk other than breastmilk and that this percentage had increased to 90% by three months. In contrast, a study in

Montreal and Toronto (Yeung, 1980) documented that only 30% of mothers were not breastfeeding on leaving hospital.

Studies in the United States are reporting similar patterns regarding milk feeding with decreasing numbers of infants initially bottlefeeding, but increasing numbers consuming other forms of milk, by three to four months (Andrew, et al., 1980; Jelliffe & Jelliffe, 1981; Marlin, Picciano & Livant, 1980; Martinez & Nalezienski, 1981).

Some studies indicate that a high proportion of infants below six months of age were fed various types of unmodified cow's milk (whole, 2%, or skim). Escott (1976) found that cow's milk was introduced into the infant's diet at varying ages. A few infants received cow's milk during the first couple of months, 17.4% by three months, and 76.2% by six months. Andrew et al. (1980) also reported unmodified cow's milk was being introduced early. She found that beginning with the 3-4.9 month age group, the percentage of infants fed whole milk started to increase. Skim milk was first fed to the 5-6.9 month age group and was given to approximately 9% of 5-11 month old infants.

In summary, fewer infants are initially receiving alternate forms of milk than breastmilk but this pattern very quickly changes and large percentages of three month old infants are receiving formula. Unmodified cow's milk is being introduced to infants' diets earlier than recommended.

Solid Foods

Recommendations

The Canadian Paediatric Society, Nutrition Committee (1980) recommends that solids be introduced at six months and not before three or four months. The Canadian Home Economics Association (1979) and the National Dairy Council (1980) support this recommendation in their recent position papers and statements on infant feeding. Saskatchewan Health (1981) also endorses this recommendation.

Solids should be added individually with several days between the introduction of each new food in order to allow for the opportunity to identify food intolerance. The order of introduction of various foods is not as important as the age of introduction but cereals are a good source of iron and consequently are usually the first food introduced. The

Saskatchewan Department of Health (1981) encourages that vegetables be introduced before fruits as research (Harasym, 1977) suggests that vegetables are better accepted if the naturally sweet fruits have not been introduced.

Foods should be introduced gradually with a view to establishing familiarity with a variety of tastes and textures toward the end of the first year by which time the infant will be ready for foods from the family table. Either commercially prepared or home prepared food is acceptable for infants. One of the main advantages of home prepared food is the ability to control sugar and starch fillers that are sometimes found in commercially prepared infant foods. There is no need to add sugar or salt to infant food.

Rationale

Both Fomon et al. (1979) and Pipes (1977) note there is no nutritional or developmental advantage for the introduction of solids before six months of age. A number of reasons have been cited in support of the recommendation regarding the age of solid introduction.

Energy Needs and Iron Stores. After about the first six months of life the energy needs of the infant may exceed those which can be met by breastfeeding or formula feeding. Addition of solid foods is therefore desirable (Fomon et al., 1979). However, if solid food is introduced too early, it may replace formula or human milk as the source of calories. Thus, if a food was used that has a lower caloric density than that of milk, human or formula, the infant might become calorie deficient. Alternately, the infant may consume quantities of unneeded solids increasing the calorie intake and the potential for overfeeding (Clark, 1981).

Solid food is also necessary at this age to supplement the infant iron source as iron stores from birth are now beginning to be depleted.

Gastrointestinal Infection and Allergies. The gastrointestinal tracts of infants are the most sensitive to foreign substances before the age of three months. During this time, defense mechanisms in the intestine are developing to protect the infant against foreign proteins that can cause allergic reactions. Avoiding the early introduction of solids may reduce the incidence of allergies especially among families with a family history of allergic responses (Gerrard, 1974).

Digestive System Development. The ability to digest and absorb other proteins, fats and carbohydrates increases rapidly at four to six months. The kidney's ability to handle osmolar loads with less water is also developing. Prior to this, solids may increase the renal solute load and the risk of dehydration (Tiatz, 1977).

Physiological Readiness. The extrusion reflex, the natural reflex to push outwardly with the tongue, disappears around three to five months of age enabling the infant to transfer food from the front of the mouth to the back. Prior to this age, the young infant's mechanism for obtaining food is sucking as evidenced by the sucking and rooting reflex which is present at birth and persists until three or four months of age (McKeith and Wood, 1977). Between four and six months, the baby begins drooling, indicating an increase in saliva, and the ability to swallow non-liquids is also established.

The ability of the infant to sit with support and have good neuromuscular control of the head and neck have been cited as another reason for the introduction of solids around the middle of the first year of life (American Academy of Pediatrics, 1980). At this time, he or she will be able to indicate desire for food by opening the mouth and leaning forward, and to indicate disinterest or satiety by leaning back and turning away (Fomon, 1974).

Breastfeeding Implications. The early introduction of solid foods has been associated with early cessation of breastfeeding, as the baby usually takes less milk, thereby reducing the supply of breastmilk (Dixon, 1980). This in turn increases the chance of infection or allergy manifestations once the infant is exposed to foods other than breastmilk (Gerrard, 1978).

Other. Solid foods are time consuming to purchase and prepare and can be expensive. Myres (1980) suggests that it has a possible association with obesity and may interfere with the establishment of appetite control, as well as be a factor in overfeeding. Furthermore, there is no evidence that solids will pacify an infant (Sage, 1978) or help it sleep through the night (Clark and Beal, 1982).

Current Practice: Age of Solid Introduction

Despite the foregoing assessment that there is no need for solid food in diets before three to four months and ideally six months of age, early introduction of solid food appears to be widely practiced. The Nutrition Canada survey data showed that foods introduced into the diet of the infant varied between one to two months with a median figure for the national population of one month in the early 70's (Canada, Department of National Health and Welfare, 1977).

The early age at which solids were introduced showed that Canada conformed to the patterns found both in the United States and Britain. Fomon (1975) reported that most infants in the United States were getting solid food by six weeks of age and many received them before four weeks of age. The results of three studies conducted in England also indicate the early introduction of solids (Skulka et al., 1972; Oates, 1973; Sleigh and Dunsted, 1975).

Recent studies show that the practices of mothers feeding infants continue to differ from the recommended methods. Escott (1976) reported that about 68% of the infants surveyed in the Halton region of Ontario were consuming solid food by two months of age. Mothers in Newfoundland were found to also be introducing solid food to their infants early: 12% by two weeks, 43% by four weeks, 92% by two months, and 100% by three months of age (Alton-Mackey, 1978). Seaman (1978) found that foods other than milk had been introduced to 90% of a sample in Prince Edward Island by three months.

In a study conducted in Manitoba, Clark and Beal (1981) found that foods other than milk were offered to 34% of one month old infants, 63% of two month old infants, and 81% of three month old infants. Yeung, Leung, Hall and Medina (1979) observed that solids were introduced later than previously reported by others. The median time for solid introduction in this study of infant feeding practices in Montreal and Toronto was two months; 64.4% had received solids at one month, 79.1% by three months, and 100.0% by six months.

The continued introduction of solid food early is also documented in several recent studies in the United States. Coles (1977) reported that the majority of nursing infants in a study in Boston had been introduced to solids by two months. A study conducted in Western Massachusetts found that cereal had been introduced into the diets of 57% and fruit to 32% of the infants by four weeks of age. By three months, 87% of the infants were consuming cereal and 80% were eating fruit (Ferris, Vilhjalmsdottir, Beal & Pellett, 1978). A survey carried out in New York found that one-third of infants less than one month of age, two-thirds of the one month old infants, and all those older than three months were given foods other than milk or formula (Andrew et al., 1980).

Factors Affecting the Time of Solid Introduction

Type of Milk Feeding. A number of studies (Clark and Beal, 1981; Dixon, 1980; Marlin et al., 1980; Myres, 1980, Ounsted and Sleigh, 1975; and Yeung et al., 1979) have documented that breastfed infants receive solids later than bottlefed infants.

Duration of Breastfeeding. Duration of breastfeeding was positively correlated with the age of introduction of solids by Escott (1976) in her Ontario study. This is in agreement with observations by Coles (1977) who found that the early introduction of solids and early weaning from the breast were significantly associated with each other. Most infants fed solids by four weeks of age had been weaned by three months, while no infant who had solids after three months had been weaned from the breast at the time of the survey.

Family Income Level. Clark and Beal (1981) found that infants from families of lower socioeconomic status were given food other than milk earlier than babies of higher socioeconomic status. Escott (1976) also found socioeconomic index to be positively correlated to the age of introduction of solid foods.

Mother's Education Level. Mother's education level was shown to be slightly correlated to the age of introduction of solid foods by Escott (1976).

Non-Significant Factors. Escott (1976) did not find that mother's age or place of residence influenced the age at which solids were introduced.

First Foods

Infant cereal is the type of food most often introduced first (Clark & Beal, 1981; Escott, 1976; Ferris et al., 1978; Marlin et al., 1980; Yeung et al., 1979). Fruits are cited as the second food most frequently offered to infants and vegetables the third type of solid food offered. Meat was generally reported as the fourth food introduced to infants' diets by the researchers.

Source of Advice

Advice from a variety of sources (medical and non-medical) appear to be influential in determining not only the time to introduce solids but infant feeding practices in general. These include: physicians, nurses, grandparents, other relatives, friends, magazines, television, radio, books, and other printed material.

Results of a study conducted by Andrew et al. (1980) indicated that mothers look to pediatricians for advice. A large percentage of women who introduced foods other than milk or formula to the baby before three months did so with the physician's sanction. Doctors were also mentioned as the most influential source of advice by Escott (1976). These findings are in contrast to Epps and Jolley (1973) who found that the source of advice on the introduction of solid food was rarely the physician or nurse but rather the grandmother, other relatives, neighbours, or friends.

Books and pamphlets were cited as the second and third most influential sources of advice by mothers in Escott's study (1976). She also found that friends, neighbours, and relatives were looked to for advice. Clark (1981) commented that the grandmothers of today's infants were the strongest supporters of the early introduction of solids. After all, that is how their children were fed and they grew up to be healthy and strong.

A study from England (Oates, 1973) reported that mothers looked to a variety of sources for advice when they had a feeding problem. The health visitor was the most popular choice. The immediate family was the second most frequently cited, family doctor was third, while the maternity unit, books and friends were other sources of advice identified.

Alton-Mackey and Orr (1978) report that the early introduction of solids and numerous formula changes were made without professional advice. This finding was also observed by Epps and Jolley (1973) and Wilkson and Davis (1978) who found that 30% of the mothers in their study reported that the decision to start solids was made entirely on their own.

Vitamin and Mineral Supplementation

Recommendations and Rationale

The only vitamin supplement recommended for the average breastfed infant is 400 IU of Vitamin D daily as the amount of Vitamin D found in human milk is reported to be low (Fomon, 1974; McKeith & Wood, 1977). A daily supplement of 0.25 mg/day of fluoride is recommended for all breastfed infants as well, because little fluoride is transmitted in breastmilk (American Academy of Pediatrics, 1979).

Commercial formulas are fortified with Vitamin C and Vitamin D, therefore, no additional vitamin supplements are required. No vitamin supplements are necessary if the infant is consuming an evaporated milk formula but a Vitamin C supplement is necessary if whole milk formula is being consumed. Supplements of Vitamins C, D, and folacin are necessary for the infant consuming goat milk formula.

The healthy full-term infant is born with iron stores that are sufficient to maintain a normal hemoglobin level until the infant is approximately four to six months of age. The Canadian Paediatric Society (1980) is currently recommending that the formula fed full-term infant receive a supplement of iron not later than four to six months of age. Iron supplements can be provided as iron drops at a daily dose of 1 mg/kg or in an iron-fortified cereal (American Academy of Pediatrics, 1976).

In areas where water supply is not fluoridated, fluoride supplements of 0.25 mg/day are recommended from birth to one year as adequate incorporation of fluoride in teeth increases the resistance to dental caries (American Academy of Pediatrics, 1978).

Current Supplementation Practices

Myres (1979) reports that a high proportion of the infant population was given vitamin supplements. In a Prince Edward Island survey (1978) 46% of infants were taking some form of supplement containing Vitamins A, C, and D, and 40% were taking a multi-vitamin preparation. Yeung (1980) also found that the diets of many infants did not need to be supplemented with vitamin preparations.

Three studies in the United States documented similar supplementation patterns. Maslansky et al. (1974) identified that 80% of infants in his study were given supplements. Vitamin supplements were given to three-fourths of the infants who were surveyed in East Harlem (Bowering, Lowenberg, Morrison, Parker & Tirado, 1978). Andrew et al. (1980) found that a large portion of infants were given unneeded supplements of Vitamins A, B_1, B_2, B_6, and C in her survey of infant feeding practices in New York.

Summary

Infant feeding recommendations and the rationale for those recommendations were outlined with regard to breastfeeding, alternate milk feedings, solid foods, and vitamin and mineral supplementation.

A review of a number of studies indicates that the infant feeding practices are obviously in need of change and improvement. Results show a substantial increase in the incidence of breastfeeding but for relatively short durations. Reasons for cessation and a number of factors related to breastfeeding practices were discussed. Older multiparous mothers with breastfeeding experience, higher levels of education, and higher incomes tended to breastfeed. Prenatal class attendance and "rooming-in" practice were also linked with higher levels of breastfeeding. Conflicting results regarding the relationship between sex of the infant and place of residence and breastfeeding practice were reported.

Commercial formulas were reported to be the primary alternative to breastfeeding during the first part of infancy. Many studies documented that unmodified cow's milk (whole) was being received by infants under six months of age while other studies confirmed the inappropriate use of 2% and skim milk during the first year of life.

The food consumption pattern of infants shows that a large percentage of infants were fed solids very early in life. Despite recommendations to delay the feeding of non-milk products until four to six months, virtually all studies reported infants were given these foods much before then. Infant cereal was cited as the most common first food offered to infants. A number of factors including type of milk feeding, duration of breastfeeding, family income level, and mother's education level were identified as significant factors influencing the age of solid introduction.

Advice from a variety of sources (medical and non-medical) were listed as influential in determining not only the time to introduce solids but infant feeding practices in general. Several researchers noted that infants were receiving unnecessary vitamin and mineral supplements.

CHAPTER III

METHOD

Introduction

This chapter provides a description of the basic steps used in the research procedure. The first section describes the population and the sampling procedure. The second section deals with the selection of the data collection method. In the third section the development and pretesting of the questionnaire instrument used in the study to collect information on infant feeding practices is presented. A description of the procedures employed in the study is found in section four. The fifth section details the data analysis and a general overview of the design of the study concludes the chapter.

The Population

The population for the study was Saskatchewan mothers and their infants 6 weeks to twelve months of age. The study group included married mothers, multiple births, premature infants, and other infants of low birthweight (less than 2500 gm) as well as full-term infants. Not included were those mothers whose infants were illegitimate, had been adopted, or who had died since birth.

Sample Selection

The study was designed to monitor infant feeding practices at four times during the first year of life, specifically six weeks, three months, six months, and twelve months, by sampling the various age groups simultaneously. These specific ages were chosen as they reflect significant times concerning infant feeding. It generally takes between four to six weeks for the mother's milk supply to be well established, thus monitoring feeding practices at six weeks would potentially identify some breastfeeding concerns; monitoring at three months and six months provides an indication of the changes in milk consumption and the time of introduction of solid food. At one year, the majority of infants should be in a transition phase receiving a wide variety of foods. By monitoring practice at various ages, some indication of the feeding patterns over the first year of life can be identified. Thus a total stratified sample was selected from Saskatchewan Health departmental records.

There were three steps in selection of the sample. The first step involved the identification of sample selection dates so infants would be the designated ages (six weeks, three months, six months, and twelve months) when the questionnaire was received. Four two-week periods were identified to provide for the desired sample size. Table 1 outlines the selection dates for each age category according to the survey mailing dates.

TABLE 1

Selection Dates for Subjects by Baby Age Category and Mailing Date

Baby Age Category	First Mailing November 3, 1980	Second Mailing November 10, 1980
Six weeks	September 20-27, 1980	September 28 - October 4, 1980
Three months	August 1-8, 1980	August 9-16, 1980
Six months	May 1-8, 1980	May 9-16, 1980
Twelve months	November 1-8, 1979	November 9-16, 1979

In the second step the names and addresses of mothers from the four designated two-week periods were obtained by computer from Saskatchewan Health departmental records.

Step three in the selection process involved a screening procedure to delete the names of mothers in cases where illegitimacy, adoption, or infant death was a factor or where the mother had an out-of-province mailing address. This screening procedure involved the checking of all names drawn for the sample against the actual birth record in each case. A total of 1976 subjects were chosen as a result of the selection process. The number of mother-infant pairs selected in each age category are shown in Table 2.

TABLE 2

Subjects Selected by Baby Age Category

Baby Age Category	Number of Subjects	Percentage of Total Sample
Six weeks	496	25.1
Three months	501	25.4
Six months	484	24.5
Twelve months	495	25.0
Total	1976	100.0

Selection of Data Collection Method

The basic criteria used in the selection of the data collection method were whether the design and content would enable a suitable examination of the research problem and the finding of answers to the research questions.

A number of different techniques are available for conducting survey research. The mail-out questionnaire technique was selected as the data collection method for the study as it was seen to have several advantages (Bennet, 1975; Fox, 1979). The main advantage was the ability to survey a large sample of respondents over a wide geographic area in a relatively inexpensive fashion. The use of standardized instructions for all respondents and the collection of specific demographic information was also available by questionnaire. The minimizing of response bias by providing the opportunity for response anonymity was seen as another advantage of the survey questionnaire method.

Alternative methods of data collection were eliminated for a number of reasons. Interviews and telephone calls were deemed much more costly and time consuming. A longitudinal method of data collection was also rejected because it was considered to be too expensive and would not provide baseline data as external influences on feeding practices during the course of the study could not be determined and controlled.

Instrument

Infant nutrition information was collected using a self-administered questionnaire survey form. Since no instrument was available for collecting data on infant feeding practices, it was necessary to develop a questionnaire for the purpose of this study. It was designed to collect specific demographic data, some prenatal information, and infant birthweights, information on actual feeding practices, and on certain factors related to those practices. The majority of the questions provided answer choices and the respondent was instructed to circle or check a choice to indicate their answer. Some questions were open-ended and required a numerical or short written answer.

Development of the Questionnaire

The questionnaire items were chosen from those areas which had been identified in a review of the literature which dealt with infant feeding recommendations and practice. The surveys by Armstrong-Monahan (1980), Clark and Beal (1979), Escott (1976), and Haworth and Kemp (1979) were consulted for information regarding content and possible wording of questions and statements.

A further identification of questionnaire items was done in two stages. In the first stage, initial copies of the questionnaire were forwarded to a number of experts in the field of nutrition to establish content validity. The questionnaire was then pretested with mothers in the second stage to establish face validity. In late June and early July, 1980, questionnaires were administered to mothers at immunization clinics in Regina and Saskatoon. As a result of these two steps, changes were made in the format of the questionnaire, wording of some sentences, and ambiguous and difficult statements were deleted.

Piloting

The revised questionnaire was pretested a second time due to major changes in the format and wording of questions following the initial pretesting and review of the instrument. Originally the final pretest was to take the form of a pilot study which involved the mailing of the instrument to a small sample of mothers in an attempt to test the questionnaire and the design methodology. The sample selected for the pilot had included 40 mothers, 10 from each age category, who were considered to be representative of the target population for which the study had been designed. Unfortunately, due to a mail strike, this piloting strategy was not possible so a second pretest of the revised instrument was conducted at immunization clinics in Regina.

Four clinics in Regina were visited in early October, 1980, for the second pretest. A total of approximately 40 mothers were contacted in north, south, east, and central Regina. Respondents were approached and given a verbal explanation of the study, instructions for completing the instrument, and asked to participate in the pilot study. These field study subjects were encouraged to ask questions and make any comments or suggestions regarding the directions, content or questionnaire format.

Following an analysis and review of the results and the comments received from the pilot group, the questionnaire was given a final revision and produced as shown in Appendix B.

Procedure

Nineteen hundred and seventy-six mothers were mailed questionnaires during the first two weeks of November, 1980. Approximately half of the surveys were sent on November 3rd with the remaining half sent on November 10th.

A cover letter requesting participation and outlining the purpose of the study and utilization of the data was attached to the questionnaire. A stamped, addressed return envelope and request card which could be returned by respondents interested in information and results were also sent with the questionnaire and cover letter. Copies of the cover letter and request card are shown in Appendix C.

No consent form was used. Consent of the subjects took the form of the completed and returned questionnaires. Those not wishing to participate in the study were not obligated to complete the questionnaire. The respondents were completely unidentifiable as no name or number was on the returned questionnaire.

A reminder card was sent to the entire sample approximately two weeks after the initial mailings (see Appendix C). As respondents could not be identified, a complete follow-up of all original subjects was made.

Analysis of the Data

Four steps were involved in the data analysis: (1) coding of the questionnaires; (2) calculation of descriptive statistics to determine frequency distributions, percentages, and mean scores; (3) preliminary chi-square analysis to examine the relationship between factors; and

(4) second level chi-square analysis to determine the specific source of significant difference identified in step three. It should be noted that infant birthweights is presented in a supplementary report entitled "Prenatal Experience and Pregnancy Outcome" (Saskatchewan Department of Health, 1983).

Coding

As the questionnaires were received, an identification code number was assigned to each. Also a health region number was added to each questionnaire following the final question on the survey. The health region was identified on approximately 76% of the questionnaires from the postmark on the return envelope. This provided for the breakdown of frequencies and percentages of specific questions by health region as shown in tables in Appendix D.

The data obtained from the questionnaires was then coded and recorded on computer disk for statistical analysis using the Statistical Analysis System (SAS) computer package at the Saskatchewan Health Systems Center in Regina.

Descriptive Statistics

Analysis of the data took place in three phases. In the first phase, descriptive statistics were calculated to identify characteristics of the sample and an indication of specific infant feeding practices. The SAS subprogram FREQUENCY was used to obtain frequency distributions and percentages for all questions. Means were calculated for breastfeeding duration, age of introduction of solid food, mother's age and education level, and family income level using the SAS subprogram MEANS.

Preliminary Chi-Square Analysis

The second phase of data analysis involved the use of the SAS program FREQUENCY with the CHI-SQUARE option. The chi-square analysis was used to examine the differences in infant feeding practices between subgroups and to evaluate the significance of the relationship between variables.

Subgroups. The population was categorized into subgroups according to family income level, mother's education level, mother's age, place of residence, prenatal class attendance, parity, breastfeeding experience, and sex of the infant.

With respect to income, three groups were defined. Respondents classed in the low income category had a gross family income less than $10,000. The middle category represented those with an income between $10,000 and $24,999 and those making over $25,000 were designated as the high income group. Income categories were arrived at following the examination of Statistics Canada (1980, p.15) figures on Income Distributions by Size in Canada: Preliminary Estimates. According to these 1979 statistics, approximately 25% of families in Saskatchewan made less than $10,000 per year, 43% of families made between $10,000 and $25,000 per year, and 32% of families had incomes in excess of $25,000. This reference base was used to subjectively designate family incomes as low, middle or high for the study population.

Education levels were determined as completion of Grade 8 or less, some high school, Grade 12, post-secondary training, some university, a university degree, or other. Thus, seven education groups were represented in the study. Mother age categories were designated as: less than 20 years, 20-24 years, 25-29 years, 30-34 years, and 35 years and over.

Three residence groups were considered: large city, small city, and rural. Large city referred to Regina and Saskatoon. Communities with 5,000 to 50,000 residents were designated as small city; thus included in this category were: Estevan, Lloydminster, Melfort, Melville, Moose Jaw, North Battleford, Prince Albert, Swift Current, Weyburn, and Yorkton. Rural was any place with a population of less than 5,000.

Rooming-in practices were categorized into five groupings: all day and all night; all day and night feedings; feeding times only; feeding times plus extra time; and other.

Other subgroups were dichotomized according to: prenatal class - attenders and non-attenders; parity - primiparas and multiparas; breastfeeding experience - experienced and non-experienced; and sex of infant - male and female.

Chi-Square Analysis. Chi-square analysis was carried out to evaluate the significance of the relationship between breastfeeding incidence and duration and the following variables: family income level, mother's education level, mother's age, place of residence, prenatal class attendance, parity, breastfeeding experience, rooming-in practice, and sex of infant.

The same variables mentioned above with the exclusion of rooming-in practice and the addition of type of milk feeding and breastfeeding duration were tested using chi-square analysis to determine their relationship to the age of introduction of solid food.

This analysis indicated that there were 15 of 28 pairs which produced a significant difference at the .01 level of probability with varying degrees of freedom from 1 to 8 depending on the size of the contingency table. Appendix E, Table 1 summarizes the results of this first level chi-square analysis. Examination of the various contingency tables produced in this analysis indicated that some further refinement of the analysis was necessary if the source of significant difference of specific practices were to be identified.

Secondary Chi-Square Analysis

The third phase of data analysis involved regroupings as a result of the findings in the first chi-square calculations and a second chi-square analysis to establish the source of significant difference by producing 2 x 2 chi-square contingency tables.

Regroupings. Regroupings were made so family income level, mother's education level, mother's age, age of solid introduction, breastfeeding duration, and rooming-in practice categories were reduced to dichotomous groups. Family income was regrouped into two groups by combining the middle and high groups. Thus two groups remained, the low income group, as those with a family income of less than $10,000 and the high income group, as those with a family income of $10,000 or more.

Mothers were regrouped by education level into two groups: those with grade 12 or less and those with post-secondary education or higher education. Mothers were also regrouped into one of two age categories: younger mothers as less than 25 years and older mothers as those who were 25 years of age or older.

Breastfeeding duration and the age of solid introduction categories initially divided mothers into three groups but were combined for the second chi-square analysis. The two resulting groups were those who had stopped breastfeeding or given solids by three months and those who breastfed longer or delayed solids until three months or later. Rooming-in categories were reduced to two groups as well: those who had their infants with them all day and all night, and those who had any other arrangements.

There was no regrouping of other variables as they were either already in dichotomous groups or proved to be non-significant at the first level of chi-square analysis and no second level chi-square analysis was conducted.

Chi-Square Analysis. The second chi-square analysis, calculated after regrouping, produced a series of 2 x 2 contingency tables which resulted in 8 of 9 pairs that were tested retaining significant differences in practice at the $p < .01$ level of probability and df = 1. A summary of this second level chi-square analysis is shown in Appendix D, Table 2.

Summary

A total stratified sample of 1976 married, Saskatchewan mothers were asked to complete an Infant Feeding Survey to provide information for a descriptive study on infant feeding practices in Saskatchewan. The population, selection, instrumentation, research procedure, and analysis of the data were described.

In Chapter IV the findings of the study are presented and discussed.

CHAPTER IV

RESULTS AND DISCUSSION

The findings of the study are reported in seven sections. The first section briefly discusses the response level of the questionnaire. The second section describes the characteristics of the sample. The next four sections deal with the particular aspects of infant feeding practices being studied. Specifically, breastfeeding is detailed in section three, alternate milk feeding is presented in section four, solid food practices are outlined in section five, and vitamin and mineral supplementation is reported in section six. The seventh section provides information on the Saskatchewan Health pamphlet "Caring is ... the right food at the right time" as well as documents mothers' comments and questions.

Generally, in each section the results are presented and discussed. More specifically, in each section that deals with a particular aspect of infant feeding the recommendation regarding the specific topic is briefly restated as a point of reference for the reader to aid in the interpretation of the study results as they relate to recommended practice. Then the results are presented and followed by a discussion with reference to recommendations and comparisons to findings of previous studies. Selected factors examined to investigate their relationship to infant feeding practices are reported in the appropriate sections.

Response Rate

This section details the number of questionnaires sent, the number returned, the number considered for the actual sample, and the response rate of the total sample and by baby age group.

The questionnaire was sent to 1976 Saskatchewan mothers of infants who were six weeks, three months, six months, and twelve months. The number of questionnaires sent to each group were: 496 to the six week group, 501 to the three month group, 484 to the six month group, and 495 to mothers whose infants were twelve months of age.

The questionnaire was returned by 400 subjects of the six week group (80.6%), 386 subjects of the three month group (77.0%), 387 subjects of the six month group (80.0%), and 344 subjects of the twelve month group (69.5%). A total of 1517 questionnaires were returned providing for an overall response rate of 76.8%.

Of those questionnaires returned, 175 were excluded from the sample because the questionnaire was not filled out when it was received resulting in a wide variation of infant ages throughout the first year of life. The study was designed to monitor infant feeding practices at six weeks, three months, six months, and twelve months. Thus, the following categories were considered for grouping the returned questionnaires: infants five to seven weeks of age made up the six week group; those 11 to 13 weeks were included in the three month group; those 25 to 27 weeks of age comprised the six month group; and infants 51 to 53 weeks of age were designated as the twelve month group. Those questionnaires returned with an infant's age indicated as any other than those designated in the design of the study were not considered for analysis.

Thus the final sample upon which results are based was comprised of 1342 mothers, 67.9% of the mothers sampled. The number of questionnaires used and respective response rates for each age category were: 330 of the six week age group (66.5%), 331 of the three month group (66.1%), 349 of the six month group (72.1%), and 332 of the twelve month group (67.1%).

Table 3 summarizes the breakdown of questionnaires sent, questionnaires returned, those selected for the actual sample, the respective response rates for the total sample as well as for each age group, and the percentage each group represents in the total sample.

TABLE 3

Summary of Participant Response by Infant Age Category

Infant Age Group	Questionnaires Mailed	Returned		Excluded	Used for Sample		Percentage of Total Sample
	number	number	%	number	number	%	
6 weeks	496	400	80.6	70	330	66.5	24.6
3 months	501	386	77.0	55	331	66.1	24.7
6 months	484	387	80.0	38	349	72.1	26.0
12 months	495	344	69.5	12	332	67.1	24.7
Total	1976	1517	76.8	175	1342	67.9	100.0

The high response rate (67.9%) and large sample size (n = 1342) allow for the findings to be representative of infant feeding practices of married mothers in Saskatchewan.

Characteristics of the Sample

Results

As previously stated, the sample for the present study consists of 1342 married mothers and their infants in Saskatchewan. The subjects comprised four distinct groups of mother-infant pairs based on infant age categories: of the 1342 subjects, 300 pairs were in the six week group, 331 pairs in the three month group, 349 pairs in the six month group, and 332 pairs in the twelve month age group (Table 4).

TABLE 4

Distribution of Sample by Infant Age Category

Infant Age Category	Number of Infant-Mother Pairs	Percentage of Sample
6 weeks	330	24.6
3 months	331	24.7
6 months	349	26.0
12 months	332	24.7
Total	1342	100.0

Distribution of the mothers according to age, education, and family income level is shown in Tables 5 to 7. The mean age for mothers was 26, and the range from 16 to 47, with the majority of mothers being in their twenties. Five mothers did not indicate their age.

TABLE 5

Distribution of Mothers by Age

Mother's Age	Number of Mothers	Percentage of Sample
Less than 20 Years	54	4.0
20-24 Years	449	33.5
25-29 Years	565	42.1
30-34 Years	223	16.6
35 Years or More	46	3.4
No Response	5	0.4
Total	1342	100.0

The education level of the mothers measured by specific levels of education ranged from completion of grade 8 or less to completion of a university degree with the average level of education reported to be completion of some kind of post-secondary training. On six questionnaires, there was no response to the education question.

TABLE 6

Distribution of Mothers by Education

Level of Education	Number of Mothers	Percentage of Sample
Grade 8 or Less	60	4.5
Some High School	139	10.4
Grade 12	499	37.2
Post-Secondary Training	325	24.2
Some University	177	13.2
University Degree	134	10.0
Other	2	0.1
No Response	6	0.4
Total	1342	100.0

A large portion of the sample (56.3%) were representative of the middle income group in Saskatchewan, that is, their family income was between $10,000 and $24,999 annually. Twenty-seven percent of the mothers were in the high income group and 7.3% were in the low income group. One hundred and twenty-eight mothers (9.5%) in the study sample did not indicate their family income level. The average annual family income of the study sample was approximately $19,500.

TABLE 7

Distribution of Mothers by Family Income Level

Income Level	Number of Mothers	Percentage of Sample
Low	98	7.3
Middle	756	56.3
High	360	26.8
No Response	128	9.5
Total	1342	100.0

In terms of place of residence, 48.7% of the subjects lived in rural areas of Saskatchewan and 51.3% were urban residents. Of the urban residents, 35.4% lived in Regina or Saskatoon and 15.9% lived in the ten smaller cities, those with a population between 5,000 and 50,000. The distribution of the sample by place of residence is shown in Table 8.

TABLE 8

Distribution of Sample by Place of Residence

Place of Residence	Number of Subjects	Percentage
Regina and Saskatoon	475	35.4
Small Cities	214	15.9
Rural	653	48.7
Total	1342	100.0

Mother's parity status is presented in Table 9. Two-thirds of the mothers, 879 (65.5%), had more than one child and thus were categorized as multiparas. Thirty-four percent of the mothers, 459, were primiparas, as this infant was their first child. Four mothers did not indicate whether or not they had other children.

TABLE 9

Distribution of Mothers by Parity Status

Parity	Number of Mothers	Percentage
Primiparas	459	34.2
Multiparas	879	65.5
No Response	4	0.3
Total	1342	100.0

Table 10 summarizes the infant status on the basis of sex. Fifty-two percent, 703 infants, were male, and 47.5%, 638 infants, were female.

TABLE 10

Distribution of the Infants by Sex

Infant Sex	Number of Infants	Percentage
Male	703	52.4
Female	638	47.5
No Response	1	0.1
Total	1342	100.0

Discussion

This study only reports infant feeding practices of married mothers and their infants. It did not investigate the infant feeding practices of illegitimate or adopted infants and in these two respects the sample is not characteristic of the general Saskatchewan population of mothers and infants.

The study population included 1976 mothers and their infants which accounted for approximately 12.0% of the annual live births in Saskatchewan according to 1977 Saskatchewan Health Vital Statistics. Thus the final study sample represented approximately 8% of infants born in Saskatchewan. The sample size (n = 1347) was considered large enough to permit meaningful analysis of the data and allow for the findings to be representative of infant feeding practices of married mothers in Saskatchewan.

In terms of mother's age, the sample was representative of the various age groups with the exception of those mothers less than 20 years of age who were under-represented. The majority of the births in Saskatchewan, as well as those in the study sample, were to mothers between 20 and 29 years of age. The average age of the mothers in the study group was 26 years while the Saskatchewan average age for married mothers delivering infants is 25.3 years.

With respect to income, the median income level of the families in the study, $19,500, is slightly above the average yearly Saskatchewan family income of approximately $17,500 (Statistics Canada, 1980). The low income group was not representative of the general Saskatchewan population as indicated in Table 11 which shows the distribution of income categories of the sample and those of Saskatchewan (Statistics Canada, 1980). Only 7.3% of the study group were in the low income group compared to approximately 40% of the general population classified as low income according to the criteria as stated.

TABLE 11

Income Levels: A Comparison of the Study Sample and the Saskatchewan Population

Income Category	Number	Percentage	Saskatchewan* Population
Low	98	7.3	39.6
Middle	756	56.3	37.7
High	360	26.8	22.7
No Response	128	9.5	--
Total	1342*	90.4	100.0

*Source: Statistics Canada. Income distributions by size in Canada: Preliminary estimates. Ottawa, 1980.

The sex distribution of infants (52.4% male and 47.6% female) and the ratio of primipara to multipara (34.2% to 65.7%) as well as the balance between urban and rural respondents closely approximate those of general population. Appendix E, Table 3 presents the comparison of these characteristics of the study sample with the general Saskatchewan population.

It is evident that the survey sample is sufficiently balanced to allow meaningful indepth analysis of feeding practices in Saskatchewan.

Breastfeeding

Recommendations

Breastfeeding is recommended as the optimal method of feeding for all full-term newborns except in the few instances where specific contra-indications are present. Ideally, breastmilk should be the only source of nutrients for most infants for the first four to six months of life (Saskatchewan Department of Health, 1979).

Incidence and Duration of Breastfeeding

Of the 1342 subjects in the sample, 1036 mothers (77.2%) initiated breastfeeding. Survey results revealed that 210 of 330 infants in the six week group (63.6%) were breastfeeding, 178 of 331 infants in the three month group (53.8%), 137 of 349 infants in the six month group (39.3%), and 40 of 332 infants one year old (12.0%) continued to breastfeed. These data are shown in Table 12.

TABLE 12

Percentage of Mothers Breastfeeding
by Infant Age Category

Infant Age Category	Number of Subjects	Number of Breastfeeders	Percentage
6 weeks	330	210	63.6
3 months	331	178	53.8
6 months	349	137	39.3
12 months	332	40	12.0
Total	1342	565	42.6

Of those women who had initiated breastfeeding, 471 mothers (45.5%) had discontinued and 565 mothers (54.5%) continued to breastfeed when the survey was conducted. The mean age of cessation for those women who had discontinued breastfeeding was 14 weeks with a range from one to 52 weeks.

Reasons for Cessation

A variety of reasons were given for the discontinuance of breastfeeding. The most frequently cited reason was of a personal nature, reported 232 times (46%). Reasons classified as personal included: embarrassment, nervousness, didn't enjoy it, always felt tired, became pregnant, ill, felt tied down, had to drink too much, figure was back in shape, returned to work, etc. Problems with the milk supply were cited 177 times (35.1%) as reason for cessation and the infant-related reasons were reported 180 times (35.1%). Reasons categorized as infant-related included: could not suck, rejected breast, had diarrhea, had jaundice, was ill, didn't gain weight, cried a lot, teething, preferred bottle, lost interest in breast, etc. Other reasons indicated for discontinuing breastfeeding included breast problems (9.5%), weaned (5.6%), husband (2.0%), and other (3.0%). Table 13 summarizes the frequency of the reasons given for cessation.

TABLE 13

Reasons Given for Cessation

Reason	Number	Percentage
Personal	232	46.0
Baby	180	35.7
Milk Supply	177	35.1
Breast Problems	48	9.5
Weaned	28	5.6
Medical	16	3.2
Other	15	3.0
Husband	10	2.0

NOTE: Percentage column totals more than 100.0% because respondents could indicate more than one reason.

Mothers who discontinued breastfeeding when the infant was six weeks or younger cited milk supply (47.0% of the time) and the baby (40.4% of the time) most often as the reason for making their decision. Personal reasons (33.9%) and breast problems (18.6%) were also frequently cited as decision-making factors.

Reasons of a personal nature were the predominant reason cited from the time the infant was seven weeks of age. Milk supply continued to be a major reason cited by mothers who terminated breastfeeding between six weeks and three months with the infant being reported (26% of the time) as the thrid most frequent reason.

After three months, personal reasons and the infant were the two most common reasons indicated for cessation being cited 53.8% and 37.1% of the time respectively. The third major reason for discontinuance between three and six months was milk supply while weaning was reported as the third major reason for termination of breastfeeding when the infant was over six months.

The husband, medical, or "other" reasons were cited by only a few mothers. Table 14 summarizes the reasons for cessation according to infant age.

TABLE 14

Reason for Cessation by Infant Age

Infant Age			
0-7 weeks	8-13 weeks	14-27 weeks	28-53 weeks
Milk Supply 47.0%	Personal 54.3%	Personal 53.8%	Personal 50.0%
Infant 40.4%	Milk Supply 38.8%	Infant 37.1%	Infant 39.7%
Personal 33.9%	Infant 25.6%	Milk Supply 25.8%	Weaned 29.3%
Breast 18.6%	Breast 6.2%	Weaned 6.1%	Milk Supply 12.1%
Medical 2.2%	Medical 3.9%	Other 4.5%	Breast 5.2%
Other 2.2%	Husband 3.1%	Medical 3.0%	Medical 5.2%
Husband 1.6%	Other 1.6%	Breast 1.5%	Husband 3.4%
Weaned 1.1%	Weaned 0.8%	Husband 0.8%	---

Factors Related to the Incidence of Breastfeeding

In an attempt to determine the existence of a relationship between the incidence of breastfeeding and eight selected variables chi-square analysis was performed. A summary of the various analyses is presented in Table 15. Five variables proved to have a significant effect on the initiation of breastfeeding.

TABLE 15

Chi-Square Analyses Between the Incidence of Breastfeeding and Selected Variables

Variable	Chi-Square Value	Degree of Freedom	Significance
Mother's Education Level	68.24	6	*
Prenatal Class Attendance	34.35	1	*
Parity	15.53	1	*
Breastfeeding Experience	90.74	1	*
Rooming-in Practice	53.16	4	*
Family Income Level	6.90	2	NS
Mother's Age	6.39	4	NS
Place of Residence	3.51	2	NS
Infant Sex	3.84	1	NS

NOTE: Calculated x^2 values and significance scores presented in this table are results of the preliminary chi-square analyses.

* $p < .01$

Mother's Education Level. Mother's education level was significantly ($x^2 = 68.24$, df = 6, $p < .01$) related to the incidence of breastfeeding. The proportion of mothers who attempted breastfeeding increased directly as the level of education of the mother increased (Table 16).

TABLE 16

Incidence of Breastfeeding by Mother's Education Level

Education Level	Total Number of Mothers	Breastfeeders
Grade 8 or Less	60	40 (66.7)
Some High School	139	90 (64.8)
Grade 12	498	352 (70.7)
Post-Secondary Training	325	268 (82.5)
Some University	177	153 (86.4)
University Degree	134	128 (95.5)
Total	1335	927 (78.4)

Calculated $x^2 = 68.24$, df = 6; $p < .01$

Further chi-square analysis calculated to identify the source of significance by reducing the mother's education level variable to a dichotomous grouping resulted in the retention of a significance between the two variables ($x^2 = 55.38$, df = 1, $p < .01$). More mothers, 551 of 638 (86.4%), with higher levels of education, that is, any post-secondary education, initiated breastfeeding than those who had completed grade 12 or less, 485 of 697 (72.7%), mothers. These data are displayed in Appendix E, Table 4.

Prenatal Class Attendance. The incidence of breastfeeding was also related to prenatal class attendance ($x^2 = 34.53$, df = 1, $p < .01$). As shown in Table 17, 86.2% of mothers (419 of 486) who attended prenatal classes initiated breastfeeding while 609 of 843 non-attenders (72.2%) chose to breastfeed.

TABLE 17

Incidence of Breastfeeding and Prenatal Class Attendance

Prenatal Class	Total Number of Mothers	Breastfeeders	
		Number	Percentage
Attendance	486	419	86.2
Non-Attendance	843	609	72.2

Calculated $x^2 = 34.53$, df = 1, $p < .01$

Parity Status. There was a significant ($x^2 = 15.53$, df = 1, $p < .01$) relationship between the incidence of breastfeeding and the parity status of the mother as well. Eighty-three percent of primiparas (383 of 459) initiated breastfeeding compared to 73.9% of multiparas (649 of 878). These results are detailed in Table 18.

TABLE 18

Incidence of Breastfeeding and Parity Status of the Mother

Parity Status	Total Number of Mothers	Breastfeeders	
		Number	Percentage
Primipara	459	383	83.4
Multipara	878	649	73.9
Total	1337	1032	77.2

Calculated $x^2 = 15.53$, df = 1, $p < .01$

Breastfeeding Experience. Breastfeeding experience proved to be a fourth factor related to the initiation of breastfeeding ($x^2 = 90.74$, df = 1, $p < .01$). Table 19 shows that 550 of 618 mothers with breastfeeding experience (89.0%) initiated breastfeeding compared to 67.1% of mothers (483 of 720) with no previous experience.

TABLE 19

Incidence of Breastfeeding as a Function of Breastfeeding Experience

Experience Status	Total Number of Mothers	Breastfeeders Number	Breastfeeders Percentage
Breastfeeding Experience	618	550	89.0
No Experience	720	483	67.1
Total	1338	1033	77.2

Calculated $x^2 = 90.74$, df = 1, $p < .01$

Rooming-in. Rooming-in practices proved to be the final factor significantly ($x^2 = 53.16$, df = 4, $p < .01$) related to the incidence of breastfeeding. More women who had their infants with them all day and all night (79.7%) or all day and for night feedings (86.8%) initiated breastfeeding than mothers who had their infants for feeding times only (73.7%), feeding plus some extra time (73.6%), or some other arrangements (57.0%). These results are presented in Table 20.

TABLE 20

Incidence of Breastfeeding and Rooming-in Privileges

Time Spent with Mother	Number of Mothers Breastfeeding		Total Number of Mothers	
	number	%	number	%
Day and Night	165	(79.7)	207	(15.5)
Day and Night Feeding	361	(86.8)	416	(31.1)
Feeding Time Only	132	(73.7)	179	(13.4)
Feeding Time Plus Extra Time	310	(73.6)	421	(31.5)
Other	65	(57.0)	114	(8.5)
Total	1033	(77.3)	1337*	(100.0)

Calculated $x^2 = 53.16$, df = 4, $p < .01$

* 5 mothers did not respond to the question.

Further chi-square analysis with the rooming-in variable regrouped into two categories did not prove to be significantly related to the initiation of breastfeeding.

Non-Significant Factors. The initiation of breastfeeding did not prove to be related to family income level (x^2 = 6.90, df = 2, p = .0318), mother's age (x^2 = 6.40, df = 4, p = .17), place of residence (x^2 = 3.51, df = 2, p = .17), or infant sex (x^2 = 3.84, df = 1, p = .05).

Factors Related to the Duration of Breastfeeding

Chi-square values calculated for the relationship between the duration of breastfeeding and selected variables are shown in Table 21. Analysis revealed that 4 of 8 variables tested were significantly related to the duration of breastfeeding.

TABLE 21

Chi-Square Analyses Between the Duration of Breastfeeding and Selected Variables

Variable	Chi-Square Value	Degree of Freedom	Significance
Mother's Education Level	34.26	6	*
Mother's Age	16.48	4	*
Parity	8.72	1	*
Breastfeeding Experience	23.48	1	*
Family Income Level	5.76	3	NS
Place of Residence	2.88	2	NS
Prenatal Class Attendance	0.13	1	NS
Infant Sex	0.13	1	NS
Rooming-In Practice	8.22	4	NS

* $p < .01$

Mother's Education Level. Mother's education level was significantly (x^2 = 34.26, df = 6, $p < .01$) related to the duration of breastfeeding. The number of mothers who were still breastfeeding at the time of the survey increased directly as the level of education increased (Table 22).

TABLE 22

Duration of Breastfeeding by Mother's Education Level

Education Level	Breastfeeding		Discontinued		Total	
	No. of Mothers	(%)	No. of Mothers	(%)	No. of Mothers	(%)
Grade 8 or Less	15	(32.6)	31	(67.4)	46	(4.3)
Some High School	43	(45.3)	52	(54.7)	95	(9.0)
Grade 12	170	(46.6)	195	(53.4)	365	(34.4)
Post-Secondary Training	154	(57.3)	115	(42.7)	269	(25.3)
Some University	91	(58.3)	65	(41.7)	156	(14.7)
University Degree	88	(68.7)	40	(31.3)	128	(12.1)
Other	2	(100.0)	0	(0.0)	2	(0.2)
Total	563	(53.1)	498	(46.9)	1061	(100.0)

Calculated $x^2 = 34.26$, df = 6, $p < .01$

Secondary chi-square analysis calculated using dichotomous groupings for mother's education level proved to be significant ($x^2 = 24.27$, df = 1, $p < .01$). Sixty percent of mothers (335 of 555) with some type of post-secondary education were still breastfeeding at the time of the survey compared to 45.1% of mothers (228 of 506) who completed grade 12 or less. These results are shown in Appendix E, Table 5.

Mother's Age. The duration of breastfeeding was also significantly ($x^2 = 16.48$, df = 4, $p < .01$) related to mother's age. As shown in Table 23, more older mothers continued to breastfeed than younger mothers.

TABLE 23

Duration of Breastfeeding by Mother's Age

Mother's Age	Breastfeeding		Discontinued		Total	
	No. of Mothers	(%)	No. of Mothers	(%)	No. of Mothers	(%)
Less than 20 years	16	(41.0)	23	(59.0)	39	(3.7)
20-24 years	161	(45.9)	190	(54.1)	351	(33.1)
25-29 years	261	(57.4)	194	(42.6)	455	(42.8)
30-34 years	105	(60.0)	70	(40.0)	175	(16.5)
35 years or more	21	(50.0)	21	(50.0)	42	(4.0)
Total	564	(53.1)	498	(46.9)	1062	(100.0)

Calculated $x^2 = 6.48$, df = 4, $p < .01$

When mothers were regrouped in two groups, those less than 25 years old and those 25 years or older, a significant ($x^2 = 14.27$, df = 1, $p < .01$) relationship remained between mother's age and the duration of breastfeeding. As shown in Appendix E, Table 6, 57.6% of mothers (387 of 672) 25 years of age or older were still breastfeeding at the time of the survey, whereas only 45.4% of mothers (177 of 390) less than 25 years of age continued to do so.

Parity. A significant relationship ($x^2 = 8.72$, df = 1, $p < .01$) was found to exist between the duration of breastfeeding and the parity status of the mother as well. Fifty-seven percent of multiparas (379 of 670) were breastfeeding their infants when surveyed compared to 47.2% of primiparas (184 of 390) as shown in Table 24.

TABLE 24

Duration of Breastfeeding and Mother's Parity Status

Parity Status	Breastfeeding		Discontinued		Total	
	No. of Mothers	(%)	No. of Mothers	(%)	No. of Mothers	(%)
Primiparas	184	(47.2)	206	(52.8)	390	(36.8)
Multiparas	379	(56.6)	291	(43.4)	670	(63.2)
Total	563	(53.1)	497	(46.9)	1060	(100.0)

Calculated $x^2 = 8.72$, df = 1, $p < .01$

Breastfeeding Experience. Breastfeeding experience proved to be the final factor having a significant ($x^2 = 23.48$, df = 1, $p < .01$) effect on the duration of breastfeeding. Table 25 presents the results of the chi-square analysis conducted to test the independence of these two factors. More mothers, 337 of 560 (60.2%), with previous breastfeeding experience were still breastfeeding their infants compared to 227 mothers (45.3%) with no experience.

TABLE 25

Duration of Breastfeeding and Breastfeeding Experience

Experience	Breastfeeding		Discontinued		Total	
	No. of Mothers	(%)	No. of Mothers	(%)	No. of Mothers	(%)
Breastfeeding Experience	337	(60.2)	223	(39.8)	560	(50.8)
No Experience	227	(45.3)	274	(54.7)	501	(47.2)
Total	564	(53.2)	497	(46.9)	1061	(100.0)

Calculated $x^2 = 23.48$, df = 1, $p < .01$

Non-Significant Variables. No significant relationship was established between the duration of breastfeeding and family income level ($x^2 = 5.76$, df = 3, p = .12), place of residence ($x^2 = 5.88$, df = 2, p = .05), prenatal class attendance ($x^2 = .13$, df = 1, p = .72), infant sex ($x^2 = .13$, df = 1, p = .72), or rooming-in practice ($x^2 = 2.22$, df = 4, p = .08).

Discussion

Results of this study indicate that the incidence and duration of breastfeeding has increased substantially in Saskatchewan since the breastfeeding study conducted in 1977 by Bergerman et al. (1979). Table 26 documents this increase by presenting a comparison of the results of the two studies. Comparison of these results with those of other studies in Canada substantiates the previously reported high levels of breastfeeding and suggest that more Saskatchewan women were breastfeeding for longer durations (Table 27).

TABLE 26

Duration of Breastfeeding in Saskatchewan:
A Comparison of 1977 and 1980 Results

Duration	Percent of Sample Breastfeeding	
	1978	1980*
Initiated	58.0	77.0
6 weeks	41.0	63.6
3 months	31.0	53.8
6 months	18.0	39.3
12 months	---	12.0

1977 n = 1093 1980 n = 1342

TABLE 27

Summary of Some Canadian Studies Reporting
The Incidence and Duration of Breastfeeding

Researcher	Year	No. of Infants	Percentage of Infants Breastfed at Different Ages				
			Initiated	3 wks	3 mos	6 mos	12 mos
Escott	1976	80	61.2	20.0	17.5	10.0	*
Bergerman	1979	1093	58.0	41.0	31.0	10.0	*
Alton-Mackey and Orr	1978	228	17.0	*	*	*	*
Seaman	1978	*	23.0	*	*	*	*
Clark and Beal	1982	423	58.0	*	28.0	*	*
Haworth and Kemp	1979	303	56.5	*	*	26.6	*
Yeung	1979	403	71.0	*	40.0	21.0	5.0
Present Study	1980	1342	77.0	63.6	53.8	39.3	12.0

* No data was available.

The reasons cited for termination of breastfeeding were similar to those reported by others, in particular Bergerman et al. (1979) and Clark and Beal (1979). Of particular interest are the reasons identified by those mothers who discontinued before the infant was 6 weeks of age, specifically milk supply and baby. This documentation suggests that a number of women are stopping before successful lactation has been established, and were perhaps not prepared for the breastfeeding experience. The references to milk supply also suggest that mothers do not understand the physiological basis of milk production - the supply and demand mechanism and the let-down reflex. Had they understood, it may have been easier for them to overcome the problems.

Breast problems were also frequently mentioned which suggests that perhaps women may need more information on preparation of the breasts. The number of reasons of a personal nature leads one to wonder if women require more support and encouragement during the breastfeeding experience. The father of the infant, medical or "other" reasons appeared to have little influence on the decision to discontinue breastfeeding. The analysis of reasons for the termination of breastfeeding by infant age provides interesting data for health professionals and has implications for future education efforts.

As expected from other studies, mother's education level, parity, and breastfeeding experience proved to be significant factors related to the incidence and duration of breastfeeding. The tendency for more mothers who had breastfeeding experience and higher levels of education to breastfeed and for longer durations than their counterparts is consistent with observations of other investigators. While more primiparas initiated breastfeeding, multiparas tended to breastfeed for longer durations.

Prenatal class attendance and rooming-in practice were found to be predisposing factors to the initiation of breastfeeding as well. This finding is also similar to results reported by previous researchers. Mother's age was the fourth factor in this study that was related to the duration of breastfeeding. The tendency for older mothers to nurse for longer durations is likewise consistent with observations of other investigators.

Other factors, including family income level, place of residence, and infant sex, identified in other studies did not prove to significantly influence breastfeeding practices in this Saskatchewan study.

In summary, primipara mothers with higher levels of education and mothers with breastfeeding experience are more likely to initiate breastfeeding as are those who have attended prenatal classes and had rooming-in privileges. Furthermore, there is a tendency of mothers who breastfeed for longer durations to be multiparas, older, better educated, and have breastfeeding experience. Thus, it is evident from the results that attempts to encourage breastfeeding should concentrate on younger mothers with lower levels of education and no breastfeeding experience. It is also apparent that health promotion efforts to increase prenatal class attendance and rooming-in practice may be one way to increase the number of women who initiate breastfeeding.

Milk Feeding

Recommendations

Commercial formulas are recommended as a more satisfactory substitute for breastmilk than any other product as they most closely resemble the composition of breastmilk. Whole and evaporated milk formulas are also suitable for infants providing appropriate modifications are made. Formula serves as a reasonable alternative to breastmilk and should be given to those infants not receiving breastmilk for at least the first six months of life and preferably the first year of life.

Unmodified whole milk is unacceptable until the infant is at least six months of age. It should not be given until the infant is consuming approximately 250 ml of solid food (6-9 months of age) and preferably not until one year of age. Two percent and skim milk are not recommended for infants during the first year of life (Saskatchewan Department of Health, 1979).

Results

Three hundred and six mothers (22.8%) chose to feed their infants some alternative form of milk other than breastmilk from birth. In the six week group, 121 of 330 infants (36.7%) were receiving milk other than breastmilk, while 157 of 331 infants in the three month group (47.4%) and 227 of 349 infants who were six months of age (65.0%) consumed alternate forms of milk. At twelve months of age, 304 of 332 infants (91.8%) were receiving a variety of kinds of milk as their main source of milk. Table 28 summarizes the breastfeeding decrease and subsequent increase of consumption of other forms of milk during the first year of life.

TABLE 28

Summary of Infants by Age Category
Receiving Breastmilk and Other Forms of Milk*

Infant Age	Breastfeeding		Other Forms of Milk		Total	
	number	(%)	number	(%)	number	(%)
6 weeks	209	(63.6)	121	(36.7)	330	(24.6)
3 months	174	(52.6)	157	(47.4)	331	(24.7)
6 months	122	(35.0)	227	(65.0)	349	(26.0)
12 months	27	(8.2)	304	(91.8)	331	(24.7)

* This table details the main form of milk infants are receiving at the various ages and consequently these figures differ slightly from Table 12 previously shown displaying the percentages of infants breastfeeding. Although the number of infants indicated may still be receiving breastmilk, it may not be their main source of milk calories.

Commercial formula was the main alternative to breastmilk for infants in the six week and three month groups. In the six week group, 110 of 330 infants (33.3%) received commercial formula while 121 of 331 infants in the three month group (36.6%) were receiving the same. The use of commercial formula decreased in the latter part of infancy as 79 of 349 infants six months of age (22.6%) and 17 of 331 twelve month old infants (5.1%) consumed this form of milk.

The use of home prepared formula was sparse; four infants six weeks old (1.2%), 14 infants three months old (4.2%), 11 infants six months old (3.2%), and four twelve month old infants (1.2%) consumed home prepared formulas. Interestingly, while the use of commercial and home prepared formulas decreased as the infant became older, the number of infants receiving a soy-based commercial formula increased. Six of 330 infants in the six week group (1.8%) received a modified commercial formula while eight of 331 infants three months of age (2.4%), 15 of 349 infants six months of age (4.3%), and 18 of 331 infants who were a year old (5.4%) received this form of milk.

The use of whole and 2% milk in the infant's diet increased with the age of the infant. One of 330 infants (0.3%) received whole milk at six weeks whereas of 331 infants in the three month group, eight infants (2.4%) were consuming whole milk, and six infants (1.8%) were receiving 2% milk. Substantially more infants in the six month and twelve month groups received whole and 2% milk. Sixty-four of 349 infants six months of age (18.3%) and 141 of 331 infants twelve months of age (42.6%) received whole milk while 57 of 349 infants and 118 of 331 infants six (16.3%) and twelve (35.6%) months old respectively consumed 2% milk.

Very few infants were given either skim or goat milk. Two of 331 infants (0.6%) received goat milk at twelve months and five infants received skim milk, one at six months (0.3%), and four at twelve months (1.2%). The main types of milk received by infants during the first year are shown in Table 29.

TABLE 29

Summary of the Main Type of Milk Received
by Infant Age Category

Milk Form	6 Weeks	3 Months	6 Months	12 Months	Total
	number (%)	number (%)	number (%)	number (%)	number (%)
Breastmilk	209 (63.3)	174 (52.6)	122 (35.0)	27 (8.3)	532 (39.7)
Commercial Formula	110 (33.3)	121 (36.6)	79 (22.6)	17 (5.1)	327 (24.4)
Home Prepared Formula	4 (1.2)	14 (4.2)	11 (3.2)	4 (1.2)	33 (2.5)
Modified Commercial Formula **	6 (1.8)	8 (2.4)	15 (4.3)	18 (5.4)	47 (3.5)
Whole Milk	1 (0.3)	8 (2.4)	64 (18.3)	141 (42.6)	214 (16.0)
2% Milk	- -	6 (1.8)	57 (16.3)	118 (35.6)	181 (13.5)
Skim Milk	- -	- -	1 (0.3)	4 (1.2)	5 (0.4)
Goat Milk	- -	- -	- -	2 (0.6)	2 (0.1)
Total Infants in Age Group	330(100.0)	331(100.0)	349(100.0)	331*(100.0)	1342(100.1)

* One mother in the 12 month group did not respond to the question on milk feeding.

** Includes soy-based and therapeutic formulas.

Discussion

Fewer mothers in Saskatchewan are initially choosing alternate forms of milk for their infants than previously documented (Bergerman et al., 1979). In addition, mothers tend to be following recommendations regarding alternate milk choice during the first part of infancy as commercial formula was consumed by the majority of infants not receiving breastmilk for at least the first three months of life. Only 4.2% of infants at this age were receiving inappropriate milk feedings.

The percentage of alternate milk feedings increases substantially by six months of age. Results indicated 30.1% of infants continue to consume formula while 18.3% and 16.3% receive whole and 2% milk. At one year, 11.7%, 42.6%, and 35.6% receive formula, whole, and 2% milk while four infants consume skim milk and two goat milk. While it is preferable that whole milk is delayed until an infant is one year of age or consuming 250 ml of solids per day, the practice of offering infants 2% milk is not recommended until children are 18 months of age. This finding indicates that some milk feeding practices in the last half of the first year of life are in contradiction of recommendations.

In general, Saskatchewan recommendations regarding alternate milk feeding are being followed by mothers, particularly during the first half of infancy. A specific area of concern for health professionals relates to the significant number of infants who are receiving 2% milk.

Solid Foods

Recommendations

Saskatchewan Health (1979a & b) recommends that solids be introduced at four to six months. Solids should be added individually with several days between the introduction of each food to allow for the opportunity to identify food intolerance. The order of introduction of various foods is not as important as the time of introduction. Cereals are a good source of iron, and therefore are a good first choice. Saskatchewan Health encourages the introduction of vegetables before fruits as research (Harasym, 1977) has shown that infants are more willing to accept vegetables if the naturally sweet fruits have not been given first. Either commercially or home prepared food is acceptable for infants. There is no need to add sugar or salt to infant food.

Age of Introduction

Seventy percent of the infants (940 of 1338) in the study group were receiving foods other than milk at the time of the survey. The age at which solid food was introduced to infants' diets varied from one week to 52 weeks. The average age of introduction to solid food was approximately 12 weeks.

As shown in Table 30, 88 of 330 infants in the six week group (26.7%) had been introduced to solids; 183 of 331 infants in the three month group (55.3%); 338 of 349 infants in the six month group (96.8%), and all but one of 332 infants in the twelve month group (99.7%) were consuming solids.

TABLE 30

Infants Receiving Solid Food by Infant Age

Infant Age Category	Total Number of Infants	Infants Receiving Solid Food	Percentage
6 weeks	330	88	26.7
3 months	331	183	55.3
6 months	349	338	96.8
12 months	332	331	99.7
Total	1342	940	70.0

Of the 1342 mothers surveyed, all but 12 had introduced solids before six months. Eleven infants in the six month group and one infant who was twelve months of age had not received solid food.

Factors Related to Age of Introduction of Solid Food

Chi-square analysis was conducted to establish the relationship between the age of introduction of solid food and ten selected variables. The results of these calculations are summarized in Table 31. Six variables proved to be significantly related to the age of introduction of solid food.

TABLE 31

Summary of Chi-Square Analyses Between the Age of Introduction of Solid Food and Selected Variables

Variable	x^2	df	Significance
Income Level	14.44	4	*
Education Level	50.46	12	*
Mother's Age	23.07	8	*
Breastfeeding Experience	17.42	2	*
Breastfeeding Duration	14.58	2	*
Type of Milk Feeding	31.72	2	*
Place of Residence	5.75	4	NS
Prenatal Class Attendance	7.12	2	NS
Parity	0.12	2	NS
Infant Sex	0.09	2	NS

* $p < .01$

Family Income Level. Chi-square analysis indicated that family income level was significantly ($x^2 = 14.40$, df = 4, $p < .01$) related to the age of introduction of solid food. More mothers in the middle income group (69.3%) had introduced solids to their infants by three months of age than their counterparts in either the high (60.3%) or low (56.6%) income groups (Table 32).

TABLE 32

Age of Introduction of Solid Food and Family Income Level

Income Level	Introduction Age 0-6 weeks	 7-13 weeks	 14-53 weeks	Total
	number (%)	number (%)	number (%)	number (%)
Low	24 (31.6)	19 (25.0)	33 (43.4)	76 (9.0)
Middle	194 (37.9)	170 (32.4)	161 (30.7)	525 (62.1)
High	62 (25.4)	85 (34.8)	97 (39.7)	244 (28.9)
Total	280 (33.1)	274 (32.4)	291 (34.4)	845(100.0)

Calculated $x^2 = 14.40$, df = 4, $p < .01$

Further chi-square analysis with both variables, mother's age and introduction age, reduced to dichotomous groups did not prove to be significant.

Mother's Education Level. Mother's education level was also significantly ($x^2 = 50.46$, df = 12, $p < .01$) related to the age of introduction of solid food. The majority of mothers with lower levels of education introduced solids to their infants' diets earlier than those mothers who had completed a university degree. As shown in Table 33, a large percentage of infants (61.8%) whose mothers were in the latter group received solids after three months of age compared to infants in the other groups.

TABLE 33

Age of Introduction of Solid Food by Mother's Education Level

Education Level	Introduction Age 0-6 weeks	 7-13 weeks	 14-53 weeks	Total
	number (%)	number (%)	number (%)	number (%)
Grade 8 or Less	20 (40.0)	14 (28.0)	16 (32.0)	50 (5.4)
Some High School	49 (44.6)	39 (35.4)	22 (20.0)	110 (11.8)
Grade 12	134 (36.6)	129 (35.3)	103 (28.1)	366 (39.1)
Post-Secondary Training	62 (28.3)	72 (32.9)	85 (38.8)	219 (23.4)
Some University	33 (29.2)	40 (35.4)	40 (35.4)	113 (12.1)
University Degree	12 (15.8)	17 (22.4)	47 (61.8)	76 (8.1)
Other	0 (0.0)	0 (0.0)	1 (0.1)	1 (0.1)
Total	310 (33.2)	311 (33.5)	314 (33.6)	935(100.0)

Calculated $x^2 = 50.46$, df = 12, $p < .01$

Further chi-square analysis calculated to identify the source of significance by reducing the two variables to dichotomous groupings resulted in the retention of a significance ($x^2 = 65.10$, df = 1, $p < .01$) between mother's education level and the age of introduction of solid food. More mothers with post-secondary education, 173 of 409 (42.3%) than those with grade 12 or less, 141 of 526 (26.8%) delayed solids until the infant was older than three months of age. Appendix E, Table 7 presents the results of the secondary chi-square analysis.

Mother's Age. The relationship between mother's age and the introduction of solid food was significant ($x^2 = 23.07$, df = 8, $p < .01$) as well. Younger mothers reported they introduced solids earlier than older mothers as presented in Table 34.

TABLE 34

Age of Introduction of Solid Food by Mother's Age

Mother's Age	Introduction Age 0-6 weeks	7-13 weeks	14-53 weeks	Total
	number (%)	number (%)	number (%)	number (%)
Less than 20 years	17 (44.7)	12 (31.6)	9 (23.7)	38 (4.1)
20-24 years	117 (37.1)	114 (36.2)	84 (26.7)	315 (33.8)
25-29 years	128 (32.6)	131 (33.3)	134 (34.1)	393 (42.1)
30-34 years	40 (25.6)	44 (28.2)	72 (46.2)	156 (16.7)
35 years or more	7 (22.6)	10 (32.3)	14 (45.2)	31 (3.3)
Total	309 (33.1)	311 (33.3)	313 (33.6)	933(100.0)

Calculated $x^2 = 23.07$, df = 8, $p < .01$

The percentage of mothers delaying solids until after three months increased proportionately with an increase in mother's age.

Mother's age continued to be a significant ($x^2 = 12.70$, df = 1, $p < .01$) factor related to the age of introduction of solids during a secondary chi-square analysis when both variables were regrouped into dichotomous categories resulting in a two by two contingency table. As shown in Appendix E, Table 8, 37.9% (220 of 580) of older mothers, those 25 years of age or more, delayed the introduction of solid food until the infant was three months or older while only 26.3% (93 of 353) of younger mothers, those under 25 years of age, delayed solids until this time.

Breastfeeding Experience. Breastfeeding experience proved to be a fourth variable significantly ($x^2 = 17.42$, df = 2, $p < .01$) related to the age of introduction of solids. Mothers with breastfeeding experience tended to delay solid introduction longer than those mothers with no breastfeeding experience (Table 35).

TABLE 35

Age of Introduction of Solid Food by Breastfeeding Experience

Breastfeeding	Introduction Age 0-6 weeks	7-13 weeks	14-53 weeks	Total
	number (%)	number (%)	number (%)	number (%)
Experience	111 (27.1)	134 (32.8)	164 (40.1)	409 (43.7)
No Experience	200 (38.0)	176 (33.5)	150 (28.5)	526 (56.3)
Total	311 (33.3)	310 (33.2)	314 (33.6)	935(100.0)

Calculated $x^2 = 17.42$, df = 2, $p < .01$

When the age of introduction variable was regrouped into two categories, the relationship between the two variables remained significant ($x^2 = 13.32$, df = 1, $p < .01$). More mothers with breastfeeding experience, 161 of 409 (40.1%), delayed solids until after the infant was three months of age than mothers who had no breastfeeding experience as only 150 of 526 (28.5%) of the latter group delayed solids until this time. The results of this secondary chi-square analysis are illustrated in Appendix E, Table 9.

Duration of Breastfeeding. There was also a significant ($x^2 = 14.58$, df = 2, $p < .01$) relationship between the duration of breastfeeding and the age of introduction of solids. As shown in Table 36, women who continued to breastfeed for a longer duration delayed the introduction of solids longer as well.

TABLE 36

Age of Introduction of Solid Food by Duration of Breastfeeding

Duration of Breastfeeding	Introduction Age 0-6 weeks	7-13 weeks	14-53 weeks	Total
	number (%)	number (%)	number (%)	number (%)
Still Breastfeeding	60 (23.2)	77 (29.7)	122 (47.1)	259 (36.4)
Discontinued	133 (29.3)	172 (38.0)	148 (32.7)	453 (63.6)
Total	193 (27.1)	249 (35.0)	270 (37.9)	712(100.0)

Calculated $x^2 = 14.58$, df = 2, $p < .01$

A second level chi-square analysis in which the introduction age was regrouped into two groups rather than three remained significant ($x^2 = 13.98$, df = 1, $p < .01$). Two-thirds of mothers (67.4%) who had discontinued breastfeeding had introduced solids before three months while only one-half of those still breastfeeding (52.9%) had followed the same practice. Appendix E, Table 10 displays the results of the secondary chi-square analysis.

Type of Milk Feeding. The type of milk feeding proved to be a final factor significantly ($x^2 = 31.72$, df = 2, $p < .01$) related to the age of introduction of solid foods. Women who breastfed their infants introduced solids later than those women who chose to bottlefeed (Table 37).

TABLE 37

Age of Introduction of Solids and Type of Milk Feeding

Type of Milk Feeding	Introduction Age 0-6 weeks	 7-13 weeks	 14-53 weeks	Total
	number (%)	number (%)	number (%)	number (%)
Breastfeeding	48 (21.2)	70 (31.0)	108 (47.8)	226 (24.2)
Other Forms	263 (37.0)	242 (34.1)	205 (28.9)	710 (75.8)
Total	311 (33.2)	312 (33.3)	313 (33.4)	936(100.0)

Calculated $x^2 = 31.72$, df = 2, $p < .01$

Regrouping of the introduction of age variable in a second level chi-square analysis remained significantly ($x^2 = 26.71$, df = 1, $p < .01$) related to the type of milk feeding. More mothers who were breastfeeding at the time of the survey, 108 of 226 (47.8%) delayed solid introduction until after three months whereas only 28.9%, 205 of 710 mothers, who were feeding other forms of milk introduced solids when the infant was older than three months. The data for these analyses are presented in Appendix E, Table 11.

Non-Significant Factors. Place of residence ($x^2 = 5.75$, df = 4, p = .22), prenatal class attendance ($x^2 = 7.12$, df = 2, p = .03), parity ($x^2 = .12$, df = 2, p = .94), and infant sex ($x^2 = .09$, df = 2, p = .96) were not significantly related to the age of introduction of solid food.

First Foods

Infant cereal was the first food offered most frequently to infants. Fifty-two percent of the mothers (484 of 928) reported this as the first solid food that was fed to their infants. Fruit juice was the next most common food offered with 36.2% of infants (336 of 928) receiving this as their first food other than milk. Table 38 summarizes the frequency with which each type of food was introduced into infant diets as either the first or second food.

TABLE 38

Summary of First Foods Introduced to Infant Diets

Type of Food	Introduced First		Introduced Second	
	frequency	(%)	frequency	(%)
Infant Cereal	484	(52.5)	202	(25.0)
Fruit Juice	336	(36.2)	243	(30.0)
Fruit	40	(4.3)	171	(21.2)
Vegetables	33	(3.6)	108	(13.4)
Other Cereals	21	(2.3)	24	(3.0)
Other	6	(0.6)	30	(3.7)
Meat or Fish	5	(0.5)	8	(1.0)
Dairy Products	3	(0.3)	19	(2.4)
Eggs	-	-	2	(0.2)
Total	928*	(100.0)	807	(100.0)

* Of the 940 mothers feeding solids to their infants, 12 did not indicate the first food that was fed.

Consumption Patterns

Infant cereal and fruit juice were the two most frequent foods fed to infants six weeks of age; 21.2% of infants received infant cereal while 12.7% consumed fruit juice. Although other foods were also fed to these young infants, less than 1.8% were receiving any other specific food.

Substantially more infants were receiving not only infant cereal and fruit juice but a variety of foods by three months. The foods that different percentages of infants at this age were receiving included: infant cereal - 45.0%; fruit juice - 27.2%; fruit - 13.6%; vegetables - 13.3%; other cereal - 3.9%; meat and dairy products - 2.4%; and eggs and other foods - 0.9%. Some foods categorized as "other" included: jello, cookies, cake, soda pop, candy, chips, and tea.

A large percentage of infants were receiving infant cereal (83.7%), vegetables (78.8%), fruit (73.1%), and fruit juice (67.6%) at six months of age. Increasing percentages were receiving other foods as well by this age: 40.7% were consuming meat; 21.5% - dairy products; 13.5% - other cereals; 12.0% - eggs; and other foods were offered to 9.5% of the infants.

The majority of year old infants were receiving a variety of foods. The percentage of infants consuming infant cereal had decreased to 30.7% and only 23.5% of infants were offered foods classified in the other groups. Table 39 summarizes the solid food consumption patterns of infants in the study sample.

TABLE 39

Food Consumption Patterns by Infant Age

Type of Food	Infant Age 6 weeks	 3 months	 6 months	 12 months
	number (%)	number (%)	number (%)	number (%)
Infant Cereal	70 (21.2)	149 (45.0)	292 (83.7)	102 (30.7)
Fruit Juice	42 (12.7)	90 (27.2)	236 (67.6)	310 (93.4)
Fruit	6 (1.8)	45 (13.6)	255 (73.1)	311 (93.7)
Vegetables	2 (0.6)	44 (13.3)	275 (78.8)	321 (96.7)
Meat	2 (0.6)	8 (2.4)	142 (40.7)	317 (95.5)
Other Cereal	3 (0.9)	13 (3.9)	47 (13.5)	245 (73.8)
Dairy Products	2 (0.6)	8 (2.4)	75 (21.5)	286 (86.1)
Eggs	3 (0.9)	3 (0.9)	42 (12.0)	262 (78.9)
Other	4 (1.2)	3 (0.9)	33 (9.5)	78 (23.5)
Total Number of Infants	330	331	349	332

Food Preparation

Approximately two-thirds of the mothers, 503 of 815 (61.7%) feeding solids prepared homemade baby food for their infants. The remaining 312 mothers (38.3%) indicated they fed their infants commercially prepared baby food. Table 40 summarizes the food preparation data.

TABLE 40

Summary of Food Preparation

Type of Preparation	Frequency	Percentage
Home Prepared	503	61.7
Commercial	312	38.3
Total	815*	100.0

* Only 815 of the 940 mothers feeding solid food responded to this question.

A small percentage of mothers (18.1%), 161 of 890, added salt to the food consumed by their infants. Most of the salt was added to vegetables (59.6%) and table food (49.1%) prepared at home. Salt was also added to meat or fish (31.0%), cereal (16.2%), and eggs (6.2%). More mothers, 251 of 924, are adding sugar than salt to the food given to infants. Twenty-seven percent of the food fed to infants had sugar added. Most of the sugar was being added to cereal (74.1%). Sugar was also being added to water (18.3%), eggs (8.0%), and fruit (1.2%). These results detailing sugar and salt additions to specific foods are shown in Appendix E, Table 12.

Source of Influence

Results indicate that the infant was the most influential factor in the decision-making regarding the age at which solids were introduced. Mothers cited the infant most frequently, 44% of the time, in answer to the question, "Who helped you most to decide when to start giving your baby solid food?" Doctors were looked to for advice 30.9% of the time, and family or friends were cited 12.5% of the time. The sources of advice are shown in order of decreasing frequency in Table 41.

TABLE 41

Sources of Influence on the Age of Solid Introduction

Source of Influence	Frequency Cited	Percentage*
Infant	423	44.3
Doctor	295	30.9
Family or Friend	119	12.5
Public Health Nurse	88	9.2
Printed Material	82	8.6
Mother	66	6.9
Other	15	1.6
Nutritionist or Dietitian	13	1.4
Media	1	0.1

* Percentage column does not add up to 100.0 because mothers could give up to three answers to this question; 954 mothers responded to this question and gave 1102 answers.

Chi-square analysis was not carried out to determine the relationship between the source of advice and the infant's age at introduction of solid foods because the cells were not independent.

Discussion

Although the findings of this study confirm that solid food is introduced early to infants' diets as documented by previous researchers, the mean age of introduction, twelve weeks, does indicate that Saskatchewan mothers are perhaps beginning to move closer to recommended practice. As shown in Table 42, the majority of Saskatchewan mothers are introducing solids to their infants at later dates than reported by recent previous studies.

TABLE 42

Summary of Some Studies Reporting Infant's Age at the Time of Introduction to Solid Foods

Researcher	Year	Number of Infants	Percentage of Infants Receiving Solid Foods at Different Ages				
			1 mo	6 wks	2 mos	3 mos	6 mos
Skulka et al.	1972	300	40	*	*	*	*
Oates	1973	100	28	43	55	77	*
Sleigh & Oustend	1975	189	*	*	72.5	*	*
Escott	1976	80	37.5	*	67.5	82.5	*
Ferris et al.	1978	*	*	*	87.0	*	*
Alton, Mackey & Orr	1978	228	43	*	92	100	*
Seaman	1978	*	*	*	*	90	*
Yeung et al.	1979	403	64.4	*	*	79.1	100
Clark & Beal	1981	423	34	*	*	63	78
Present Study	1980	1342	*	26.7	*	55.3	96.8

* No data was available.

As reported by other researchers, a number of factors including family income level, mother's education level and age, breastfeeding experience, breastfeeding duration, and type of milk feeding influence the age of solid food introduction. Breastfeeding mothers who have higher levels of education and who breastfed for longer durations tend to delay solids longer than their counterparts. These findings are consistent with observations made by other researchers.

In contrast to findings of Clark and Beal (1981) and Escott (1976), mothers in the middle income category in Saskatchewan introduced solids earliest rather than those in the lower income category as reported by these two researchers. Also, age proved to be a significant factor in this study but was reported as insignificant by Escott (1976). Older mothers tended to delay solids longer than younger mothers. Breastfeeding experience, although not considered in previous studies, was identified as another factor related to the age of solid food introduction.

The order in which solid foods were offered to infants was similar to the patterns of solid food use reported by others. Infant cereal and fruit juice were the first two foods offered to most infants. Contrary to recommendations, fruits were introduced more frequently before vegetables.

Advice from various sources, both medical and non-medical, appear to be influential in determining the time of solid food introduction. The infant is cited the most often as the factor in the decision-making. Such reasons as the baby was hungry, fussy, and crying were advanced in support of the introduction of solids to calm and comfort. This finding indicates that mothers may benefit from more detailed instruction on baby's needs and adjustments during the first year of life. Perhaps a better understanding of infant feeding as well as other needs would help mothers to cope more effectively or in other ways rather than giving their infants food as a means of pacifying them. Results also indicate a number of infants are receiving solid food early with the doctor's sanction. Thus some doctor's advice seems to be in contradiction to recommended practice. Mothers who were influenced by family members or friends introduced solids to their infants earliest, 49% by six weeks and 83% by three months. When the mother made the decision herself, 71% of the infants had received solids by three months. These findings suggest that not only mothers but a much broader population, including physicians, family, friends, and the general public, need to be educated regarding the reasons for the delaying of solid introduction to infants' diets.

In summary, infant feeding practices in Saskatchewan related to solid food are in need of improvement. Education and health promotion efforts focused on the delaying of solids for a wide audience appears necessary. More specifically, younger mothers with lower levels of education who are not breastfeeding or do so for relatively short duration, and those who have no breastfeeding experience as well as doctors, families, and friends comprise a target population for educational efforts.

Vitamin and Mineral Supplementation

Recommendations

It is recommended that the breastfed infant receive a daily supplement of 400 IU's of Vitamin D and a daily supplement of fluoride. Infants consuming commercial or evaporated formulas require no supplements but a Vitamin C supplement is necessary if whole milk formula is being consumed. A supplement of iron or iron fortified cereal is recommended at four to six months of age. In areas where the water supply is not fluoridated, fluoride supplements of 0.25 mg/day are recommended from birth to one year.

Results

Sixty-eight percent of the infants, 914 of 1342, in the study were receiving vitamins. Most (90%) were receiving only one supplement, 9.4% (86 infants) were receiving two, and 7 infants (0.8%) were receiving three vitamin and/or mineral supplements.

As illustrated in Table 43, vitamin supplementation increased as the infants became older. In the six week group, 188 of 330 infants (57.0%) were receiving vitamins compared to 229 of 331 infants three months of age (69.2%), 257 of 349 infants six months of age (73.6%), and 232 of 332 infants twelve months of age (69.9%).

TABLE 43

Supplementation by Infant Age

Infant Age Category	Number of Infants		Percentage
	Total	Receiving Supplementation	
6 weeks	330	188	57.0
3 months	331	229	69.2
6 months	349	257	73.6
12 months	332	232	69.9
Total	1342	906	67.5

Type of Supplementation. Trivisol was the supplement most frequently given. Fifty-three percent of mothers reported giving this vitamin supplement to their infants. Triviflor was the second most frequently administered supplenent, as 25.6% of mothers indicated that their infants received this supplement. Table 44 shows the frequency of supplementation of various vitamins and minerals. Appendix E, Table 13 presents the type of supplementation by infant age.

TABLE 44

Summary of Types of Supplementation Received

Type of Supplementation	Number of Infants Receiving	Percentage
Trivisol	482	52.7
Triviflor	234	25.6
Iron	61	6.7
Ostoco	60	6.6
Other	53	5.8
Polyvisol	50	5.5
Polyviflor	43	4.7
Fluoride	24	2.6

Total Number of Infants Receiving Supplementation - 914

Note: Number column totals more than 914 and percentage column does not add up to 100.0% because respondents could indicate more than one supplement.

Frequency of Supplementation. Most of the infants (91.5%) being given vitamins and/or minerals received them once a day. Other frequencies (Table 45) included three to five times a week (9.5%), more than once a day (4.4%), once a week (3.0%), and less than once a week (1.6%).

TABLE 45

Frequency of Vitamin and/or Mineral Supplementation

Frequency	Number of Infants Receiving	Percentage
Once a day	837	91.5
3-5 times a week	87	9.5
More than once a day	40	4.4
Once a week	27	3.0
Less than once a week	15	1.6

Total Number of Infants Receiving Supplementation - 914

Note: Number column totals more than 914 and percentage column does not add up to 100.0% because respondents could indicate more than one supplement.

Supplementation by Milk Feeding. Sixty-eight percent of breastfed infants receive a variety of supplements. Of infants receiving commercial or modified commercial formula, 59.3% and 48.9% respectively also are receiving vitamin or mineral supplementation. Approximately one-third of infants consuming home prepared formula (36.4%) receive supplementation. The percentage of supplementation increases when infants are drinking whole or 2% milk as 84.6% and 76.2% respectively receive vitamins or minerals. Sixty percent of infants drinking skim and 100% of those consuming goat milk also receive supplementation. These data are detailed in Table 46.

TABLE 46

Percentage of Infants Receiving Supplementation by Type of Milk Feeding

Type of Milk Feeding	Total Number of Infants	Number Receiving Supplementation	Percentage
Breastmilk	532	359	67.5
Commercial Formula	327	194	59.3
Home Prepared Formula	33	12	36.4
Modified Commercial Formula*	47	23	48.9
Whole Milk	214	181	84.6
2% Milk	181	138	76.2
Skim Milk	5	3	60.0
Goat Milk	2	2	100.0
Total	1341	913	68.1

* Includes soy-based and therapeutic formulas.

The supplementation patterns according to the type of milk the infant received and specific type of vimtain and/or mineral are summarized in Appendix E, Table 14. The two major supplements being offered to infants receiving all kinds of milk are Trivisol and Triviflor as they account for 71.2% of all supplementation.

Discussion

Supplementation practices appear to be contrary to recommended practices. A number of infants in Saskatchewan appear to be receiving unneeded supplements. Specially, 58.3% of infants consuming commercial formulas are receiving supplementation while 36.4% of those consuming home prepared formula also recieve vitamins or minerals while only Vitamin C supplementation is recommended for those infants receiving whole milk formula. Also, the percentage of supplementation increases over the first year of life when one would expect the percentage of supplementation to decrease because of the increasing number of infants who receive a variety of solid food.

On the other hand, it appears that not all breastfed infants are receiving the daily recommended Vitamin D supplements and only one-third of breastfed infants receive fluoride. Although no data was collected regarding the fluoride content of respondent's water supply, the expected frequency of fluoride supplementation was predicted to be higher.

The general findings of this study regarding supplementation are consistent with those of other researchers who also reported high percentages of unneeded supplements being offered to infants.

Pamphlet Information and Mothers' Comments and Questions

Pamphlet Information

In 1979, Saskatchewan Health made available a pamphlet entitled "Caring is ... the right food at the right time" for the general public. This pamphlet outlined recommendations and guidelines for infant feeding practices. A few questions were asked regarding "Caring is" to assess the distribution pattern of the pamphlet and the mother's perception of its content and value.

The majority of the mothers surveyed (67.4%) indicated they had received a copy of the pamphlet. When questioned regarding where they had obtained the pamphlet, several sources were identified. As shown in Table 47, 58.9% of the mothers received their copy from a public health nurse, 2.7% from the hospital, 8.3% from doctors, 2.7% from a nutritionist or dietitian, and 3.1% from other persons or places.

TABLE 47

"Caring is" Pamphlet Distribution Source

Pamphlet Received From	Number of Mothers	Percentage of Total
Public Health Nurse	528	58.9
Hospital	242	27.0
Doctor	74	8.3
Other	28	3.1
Nutritionist/Dietitian	24	2.7
Total	896*	100.0

* 4 mothers did not indicate where they received their pamphlet.

The pamphlet was regarded as very valuable by 37.3% and somewhat helpful by 50.1% of the mothers. Only 3.7% of the respondents indicated that the pamphlet was not too valuable, and 6.6% of those who received it had not read it. These data are presented in Table 48.

TABLE 48

Mother's Perception of the Value of "Caring is"

Perception of "Caring is"	Number of Mothers	Percentage of Total
Very Valuable	332	37.2
Somewhat Valuable	445	50.1
Not Too Valuable	33	3.7
Did Not Read	59	6.6
Other	20	2.3
Total	889*	100.0

* 11 mothers did not indicate their opinion of the pamphlet.

A number of mothers (155) made comments on the "Caring is" pamphlet. These comments made by the mothers regarding the pamphlet may be classified according to the following subject areas:

a) Positive comments. Over half the comments were of a positive nature noting that they found the pamphlet easy to read, interesting, informative, well prepared, organized and written, and an excellent reference. These comments were qualified in some cases with reference to a specific topic the respondent felt was particularly interesting. Some sections mentioned included homemade foods, breastfeeding, and alternate milk feedings.

b) Solid Foods. The area of solid foods seems to be the cause of a lot of confusion and conflict. Thirty-five mothers made comments related to solid foods. Many mothers took dispute with the recommended age of introduction of solid foods, while others questioned the amounts and preparation of solids.

c) Requests For More Information. Approximately 30 of the mothers suggested topics they would like to see included in the pamphlet or on which they would like more detail or information. The topics covered a broad and diverse scope. Appendix F, Table 1 lists all the suggestions mentioned by the mothers.

d) A Guide Only. Thirteen mothers commented that the pamphlet could only be used as a guide because every child was different.

e) Inconsistency. Ten mothers expressed that recommendations and guidelines set out in the pamphlet were inconsistent with what they had been told by their doctor. One mother suggested the information in the pamphlet contradicted what a public health nurse had told her.

f) Other. A few mothers commented on how the pamphlet should be distributed, three mothers noted it was a general reference on baby food, and disagreement was expressed on vitamin supplementation and the starting age for whole and 2% milk.

Mothers' Comments and Questions

The last two questions on the Infant Feeding Survey asked the respondents if they had any comments or questions about infant feeding. Two hundred and thirty-four mothers (17.4%) made comments and 271 mothers (20.2%) asked questions about feeding their infants. Since many of these comments and questions related to various aspects of infant feeding, it was difficult to place each comment or question into a specific category. However, by making a subjective assessment and analysis of the questions and comments, it was possible to classify responses into one of ten main categories. Table 49 shows a summary of the tabulation of responses into categories.

TABLE 49

Summary of Mothers' Comments and Questions on Infant Feeding by Category

Category	Number of Questions and/or Comments	Percentage of Total
Solids	159	29.2
Breastfeeding	72	13.2
Feeding Times	45	8.3
Bottlefeeding	37	6.8
Allergies	36	6.6
Problems	35	6.4
Supplementation	34	6.2
Food Preparation	32	6.0
Health Professional Advice	25	4.6
Other	69	12.7
Total*	544	100.0

* The total number of items equaled more than the total number of responses as some mothers commented on more than one aspect of infant feeding in their response.

Solids. The largest category, comprising 29.2% of the responses, was made up of comments and/or questions about solids. Responses in this category included questions or remarks regarding: when to start solids; the order of introduction; how to introduce solids; amounts and feeding times; what to do with a hungry baby; the rationale for the suggested introduction age; solids for sleeping through the night; vegetables versus fruits; pressure from family; table foods; finger foods; and appropriate snacks. The number and nature of comments on solids indicates that this aspect of infant feeding causes the greatest concern and frustration to mothers.

Breastfeeding. The second largest number of remarks were directed towards the topic of breastfeeding. A number of mothers agreed with the recommendations that "breast is best." Many of the other mothers who responded wanted more information on specific aspects of breastfeeding including: the rationale for breastfeeding; mother's diet; the effect of drugs; problems encountered; bottle supplementation; duration; preparation; amount; and milk testing. The general nature of the comments were positive and suggest mothers want to know more about breastfeeding.

Feeding Time. Some mothers expressed uncertainty or opinions regarding feeding times and amounts. The amount to feed seemed to be the biggest concern in this category. The remaining responses were on the timing of feeding, how long between feedings; and demand versus schedule feeding.

Bottlefeeding. Although only 37 responses referred to bottlefeeding, there appears to be a need for information on alternatives to breastfeeding. Those mothers who questioned or made comments in this category felt there was a general lack of information on bottlefeeding because breastfeeding is considered optimal.

A number of mothers addressed the question of formulas asking the differences between brands, strengths, and weaknesses as well as preparation and duration of this type of feeding. Other milks were also discussed. Many mothers questioned the difference between whole and 2% milk, and a couple of respondents promoted goat milk as a suitable alternative.

Allergies. Another topic of interest of mother's was allergies. Mothers questioned about dealing with allergies, why infants develop allergies, and sources of information and help.

Problems. A number of mothers reported on problems they had or were encountering in the feeding of their infants. Some of these problems included: colic; teething; and the reaction to the food the breastfeeding mother eats.

Supplementation. Recommendations on vitamin and/or mineral supplementation are a cause of concern for some mothers also. Responses indicate confusion and lack of understanding on supplements recommended, the necessity and rationale for supplementation, as well as amounts and frequency of supplementation. Questions were also asked about specific vitamins and minerals.

Food Preparation. An eighth aspect of feeding of concern was food preparation. A number of mothers wanted more information on home versus commercially prepared baby food, how to prepare homemade baby food, additives, and recipes for infant foods.

Health Professional Advice. Some of the comments indicated a sense of confusion and frustration among mothers as they were receiving different and inconsistent information from different health professionals. The following comments illustrate this concern:

> "...My health nurse uses 'Caring is...' but my doctor doesn't seem to follow it..."

> "...in the hospital each nurse contradicted the other about when to breastfeed the baby, i.e. when it acts hungry or every three hours, or every four hours and supplement with water."

> "...the doctor and the public health nurse do not agree on when to start feeding solids. This is very confusing and frustrating to a new nervous mother."

Other. Responses categorized as "other" were those topics mentioned less than 20 times. As shown in Table 50, the topics in the "other" category included: questions on weaning; mother's feelings and intentions; comments on changes in practices; opinions on hospital feeding practices; suggestions on how to distribute "Caring is...," as well as questions on feeding water; night feedings; and nutritional requirements.

TABLE 50

Summary of Topics Classified as "Other"

Topics	Number of Comments or Questions
Weaning	18
Mother's Feelings and Intentions	16
Changes in Practice	8
Hospital Practices	8
"Caring is..."	6
Water	6
Night Feeding	5
Nutritional Requirements	4
Total	69

Discussion

The majority of the mothers (67.4%) surveyed received a copy of the pamphlet "Caring is...". Most mothers received the pamphlet from a public health nurse or the hospital while the other mothers obtained it from the doctor, nutritionist or dietitian, or some other source. Overall, the pamphlet is very well received and 87.4% of the women found it valuable. Comments regarding the pamphlet were generally of a positive nature. Some areas of conflict were identified and some suggestions for additions were indicated.

The comments and questions made by mothers fell into ten common categories: solids; breastfeeding; feeding times; bottlefeeding; allergies; problems; supplementation; food preparation; health professional advice; and other. The number and nature of the comments and questions seems to indicate the need for education programs on infant feeding for mothers. A variety of approaches to provide mothers with information need to be investigated. Responses also suggest that mothers need support and guidance during the child's first year.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

In this chapter, recommended infant feeding practices are restated, results of the study are summarized, and recommendations for health education and promotion are identified.

Recommended Infant Feeding Practices

Milk Feeding. Breastmilk is recommended as the ideal source of nutrients for the first six months of life. When breastfeeding is unsuccessful, inappropriate, or discontinued early, commercial formulas are recommended as a more satisfactory substitute than any other product. Whole and evaporated milk formulas are acceptable, providing appropriate modifications are made. Unmodified whole milk is unacceptable until the infant is at least six months of age or until the infant is consuming 250 ml of solid food and preferably not until one year of age. Two percent and skim milk are not recommended for infants during the first year of life.

Solid Food. Saskatchewan Health (1979a & b) recommends that solids be introduced at four to six months. The order of introduction of various foods is not as important as the time of introduction, but cereals are a good source of iron and therefore a good first choice. The introduction of vegetables before fruits is encouraged. Either commercially or home prepared food is acceptable for infants. There is no need to add salt or sugar to this food.

Supplementation. It is recommended that the breastfed infant receive a daily supplement of 400 IU's of Vitamin D and a daily supplement of fluoride. Infants consuming commercial or evaporated formulas require no supplements but a Vitamin C supplement is necessary if whole milk formula is being consumed. A supplement of iron or iron-fortified cereal is recommended at four to six months of age. In areas where the water supply is not fluoridated, fluoride supplements of 0.25 mg/day are recommended from birth to one year.

Summary of Study Results

The infant feeding practices of 1342 Saskatchewan married mothers were studied. Data was obtained through a mail-out questionnaire designed to collect information on specific aspects of infant feeding practices and demographic information on the sample. The results are summarized according to the following five topics studied: breastfeeding, alternate milk feedings, solid food, vitamin and mineral supplementation, pamphlet information and mothers' comments and questions.

Breastfeeding. More Saskatchewan women are attempting to breastfeed and for longer durations. Seventy-seven percent of the women sampled initiated breastfeeding. At six weeks, 63.3% continued to breastfeed. This percentage decreased to 53.8% by three months and 39.3% at six months while 12% of mothers continued to breastfeed at twelve months. Of those women who had discontinued breastfeeding at the time of the survey, the mean age of cessation was approximately 14 weeks. Personal reasons, the infant, and milk supply were the three most frequently and consistently cited reasons for cessation. Mother's education level, prenatal class attendance, parity, breastfeeding experience, and rooming-in were significant factors related to the initiation of breastfeeding while mother's age and education level, parity, and breastfeeding experience proved to be related to the duration of breastfeeding.

Alternate Milk Feedings. Commercial formula was the main alternative to breastmilk for the first six months of life. The use of modified commercial formula increased over the first year of life. Whole and 2% milk were introduced early. Approximately 5% of three month old infants were receiving these two kinds of milk while 34% of six month old infants and 78.2% of twelve month old infants were consuming either whole or 2% milk. Twenty-seven percent of infants received 2% milk in the first year of life. Home prepared formula, skim and goat's milk were sparsely used.

Solid Foods. Saskatchewan infants are introduced to solid foods early. The average age for solid introduction was approximately three months (12 weeks). The first foods infants usually received were infant cereal and juice. Fruits were introduced most often before vegetables. The majority of infants receive home prepared foods, and 18% of infants had salt added to their food while 27% received sugar in some foods. The infant and the doctor were the two factors most influential in determining the time of solid introduction.

Family income level, mother's age and education level, as well as breastfeeding experience, breastfeeding duration, and type of milk feeding were related to the age of introduction of solid food. Older, better-educated mothers in either the low or higher income levels with breastfeeding experience tended to delay solids later than their counterparts. Also, mothers who breastfed rather than bottlefed and who continued to breastfeed for longer durations delayed the introduction of solids longer as well.

Vitamin and Mineral Supplementation. Supplementation is quite widespread as 68% of infants surveyed were receiving vitamins. Most infants (90%) received only one supplement, 9% were receiving two, and 7 infants (0.8%) were receiving three vitamin and/or mineral supplements. Supplementation increased as infants became older. Trivisol was the supplement most frequently given and Triviflor was the second most frequently cited supplement. Most infants being given vitamins and/or minerals received them once a day. Supplementation practices appear to be contradictory to recommended practice. Many infants are receiving unneeded supplements while some infants are not receiving those that are recommended.

Pamphlet Information and Mothers' Comments. The majority of the mothers (67.4%) surveyed received a copy of the pamphlet "Caring is...". Most mothers received the pamphlet from a public health nurse or the hospital while the other mothers obtained it from the doctor, nutritionist or dietitian, or some other source. Overall the pamphlet is very well received, and 87.4% of the women found it valuable. Comments regarding the pamphlet were generally of a positive nature. Some areas of conflict were identified; some suggestions for additions were indicated.

The comments and questions made by mothers fell into ten common categories including: solids, breastfeeding, feeding times, bottlefeeding, allergies, problems, supplementation, food preparation, health professional advice, and other. The number and nature of the comments and questions seems to indicate the need for education programs on infant feeding for mothers. A variety of approaches to provide mothers with information need to be investigated. Responses also suggest that mothers need support and guidance during the child's first year.

Recommendations

Breastfeeding:

1. That all mothers be encouraged to attend prenatal classes as they appear to be a significant factor related to the initiation of breastfeeding.
2. That rooming-in regulations and practices in Saskatchewan be reviewed to establish the extent to which this practice is encouraged.
3. That rooming-in practice be allowed and encouraged.
4. That continued public education about the benefits of and preparation for breastfeeding be available to expectant mothers. More specifically, that these health promotion efforts reach younger, inexperienced mothers who have lower levels of education in an attempt to encourage more mothers to breastfeed.
5. That health professionals provide continuing support and information on the establishment of lactation, the successful management of and factors that affect breastfeeding to encourage the maintenance of breastfeeding once it is established.

Alternate Milk Feedings:

6. That the use of partially skimmed (2%) milk be discouraged and that mothers be made aware of the reasons for excluding this form of milk from the infant's diet.

Solid Foods

7. That education about the possible harmful effects of the early introduction of solids and the benefits of delaying these foods be made available for all parents. Careful explanations of the signs of readiness will help parents feel confident in introducing new foods when their child is ready.

Vitamin and Mineral Supplements

8. That mothers receive information on the recommended supplements as it appears supplementation practices are contrary to recommendations.

General

9. That more information about infant behaviour and what it means be made available to mothers.
10. That health education and promotion efforts be directed towards a wider audience. Family and friends as well as physicians could benefit from

instruction on the new research and practices that are meant to reduce the risk of problems within the first year of life.

11. That health professionals work together to provide a more consistent message to parents on infant feeding practices.
12. That a variety of health education and promotion efforts be initiated and focus on infant feeding practices and infant care. A number of ways of delivering postnatal care and education efforts need to be considered.
13. That the pamphlet "Caring is" continue to be distributed and that additional distributing patterns be considered as only 58.9% of mothers are receiving this guide.
14. That information about feeding the very young be part of all training programs from Kindergarten to matriculation.

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[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] intake and growth of [illegible] Paper presented at [illegible] May 22, [illegible]

APPENDIX A

DEFINITIONS

DEFINITIONS

The following terms are defined for the purposes of this study:

Infant: is defined as a baby from 0 - 12.0 months of age.

Infancy: is the first year of life (0 - 12.0 months of age).

Breastfed infants: are defined as infants who were given breastmilk irrespective of whether they were supplemented with formula or cow's milk.

Non-breastfed infants: are those infants who were never fed from the breast.

Solid food: refers to any food other than milk and water. This includes fruit juices.

Primipara: is a mother who has her first child.

Multipara: is a mother having two or more children.

[illegible]

[illegible] In [illegible]

[illegible]

[illegible]

[illegible]

APPENDIX B

INFANT FEEDING QUESTIONNAIRE

INFANT FEEDING SURVEY

FOR OFFICE USE ONLY

WHEN ANSWERING THE QUESTIONS, UNLESS OTHERWISE INDICATED, PLEASE CIRCLE ONE NUMBER FOR YOUR ANSWER.

For example: This month is:

1. OCTOBER
[✓ 2.] NOVEMBER
3. DECEMBER

1 2 3

4 5 6 7

PLEASE ANSWER THE QUESTIONS ABOUT YOUR YOUNGEST CHILD.

---

1. How old is your baby? ____________________ 8 9

2. Is your baby a:

   1. BOY
   2. GIRL

10

3. What was your baby's birthweight? ______________ 11 12 13 14

4. How much does your baby weigh NOW? ______________ 15 16 17 18

5. How much weight did you gain during THIS pregnancy? __________ 19 20

6. a) Did you attend a prenatal class during THIS pregnancy?

   1. YES
   2. NO (IF NO, GO TO QUESTION 7)

21

   b) IF YES, who held the classes?

   1. PUBLIC HEALTH OFFICE
   2. HOSPITAL
   3. OTHER (please explain) ____________________
   4. DON'T KNOW

22

   c) IF YES, did any of the classes include information on feeding your baby?

   1. YES, GIVEN BY A NURSE
   2. YES, GIVEN BY A NUTRITIONIST/DIETITIAN
   3. YES, GIVEN BY A NURSE AND A NUTRITIONIST/DIETITIAN
   4. YES, GIVEN BY SOMEONE ELSE (please explain) ____________________
   5. YES. BUT I DID NOT ATTEND THAT CLASS
   6. NO, IT WAS NOT INCLUDED
   7. DON'T REMEMBER

23 24 25 26

7. a) Have you ever attended prenatal classes?

   1. NO
   2. YES

27

   b) IF YES, how long ago? ____________________ 28 29

(OVER)

8. a) How long was your baby allowed to stay with you during the first few days after birth?

1. **ALL DAY AND ALL NIGHT**
2. **ALL DAY AND NIGHT FEEDING**
3. **AT FEEDING TIMES ONLY**
4. **AT FEEDING TIMES PLUS EXTRA TIME WITH YOU**
5. **OTHER (please explain) ____________________**

____ 30

b) Who made the decision that your baby could stay with you?

1. **NURSE**
2. **YOU**
3. **NURSE AND YOU**
4. **OTHER (please explain) ____________________**

____ 31

9. Which of the following kinds of milk have you given your baby THIS WEEK? (please indicate with a check (✓) in the first column the MAIN kind of milk and in the second column any OTHER kind of milk which may have been given)

MAIN	OTHER	KIND OF MILK
		BREASTMILK
		COMMERCIAL FORMULA (for example: ENFALAC, SIMILAC, SMA, etc.)
		HOME PREPARED EVAPORATED MILK FORMULA
		HOME PREPARED WHOLE MILK FORMULA
		HOME PREPARED GOAT MILK FORMULA
		PLAIN WHOLE MILK
		PLAIN 2% MILK
		PLAIN SKIM MILK
		PLAIN GOAT MILK
		OTHER (please explain) ____________

32 33 | 34

35 36 | 37

38 39 | 40

41 42 | 43

10. a) Did you ever breastfeed this baby?

1. **NO (IF NO, GO TO QUESTION 11)**
2. **YES**

____ 44

b) Are you breastfeeding this baby now?

1. **YES (IF YES, GO TO QUESTION 11)**
2. **NO**

____ 45

10. c) How old was this baby when you stopped breastfeeding? 46 47

____

d) Why did you stop breastfeeding? ________________ 48 49

____ 50 51

____

11. a) How many other children do you have? ________ 52 53

b) Did you breastfeed any of your other children? 54 55

1. YES (how many?) ________ 56 57 58
2. NO (how many?) ________
3. NO, THIS IS MY FIRST CHILD 59 60 61

12. Are you giving your baby any vitamin or mineral drops? 62 63

1. YES
2. NO (IF NO, GO TO QUESTION 14) 64

13. Which of the following have you given your baby THIS WEEK? (please indicate with a check (✓) which you have given and how often for each)

TYPE	MORE THAN ONCE A DAY	ONCE A DAY	3-5 TIMES A WEEK	ONCE A WEEK	LESS THAN ONCE A WEEK	DON'T KNOW
FLUORIDE DROPS						
IRON DROPS						
TRI-VI-SOL						
TRI-VI-FLOR						
POLY-VI-SOL						
POLY-VI-FLOR						
OSTOCO						
OTHER (indicate what kind)						

65 66 67

68 69 70

71 72 73

14. Are you giving your baby any food or drink other than milk? THIS DOES NOT INCLUDE WATER.

1. NO (IF NO, GO TO QUESTION 22) 74
2. YES

(OVER)

15. How OLD was your baby when you first gave any food or drink other than milk? THIS DOES NOT INCLUDE WATER. ______________

75 76

16. What were the first TWO NON-MILK foods or drinks offered? THIS DOES NOT INCLUDE WATER.

1st ______________________

2nd ______________________

77 78

79 80

17. Which of the following foods did you feed your baby THIS WEEK? (please indicate with a check (✓) the food(s) given and how often each was given)

TYPE OF FOOD	THREE TIMES A DAY	TWICE A DAY	ONCE A DAY	3-5 TIMES A WEEK	LESS THAN ONCE A WEEK	DON'T KNOW
INFANT CEREAL						
OTHER CEREAL (indicate what kind)						
VEGETABLES						
FRUIT JUICES						
FRUIT						
MEAT OR FISH						
DAIRY PRODUCTS						
EGGS						
OTHER (please explain)						

1 8 9

2 10 11

3 12 13

4 14 15

5 16 17

6 18 19

7 20 21

8 22 23

9 24 25

18. Not including cereals, which of the following BEST describes the type of food you feed your baby?

1. ONLY STORE BOUGHT BABY FOOD
2. ONLY HOME MADE BABY FOOD
3. MAINLY STORE BOUGHT BABY FOOD
4. MAINLY HOME MADE BABY FOOD

26

19. Do you add salt to the food you give your baby?

1. NO
2. YES (please explain to which foods) ______________

____

27 28 29

20. Do you add sugar to the foods or drinks you give your baby?

    1. NO
    2. YES (please explain to which foods) ____________

    ____

30 31 32

21. Who helped you most to decide when to start giving your baby solid food?

    1. DOCTOR
    2. BABY
    3. PUBLIC HEALTH NURSE
    4. NUTRITIONIST/DIETITIAN
    5. FAMILY OR FRIENDS
    6. MEDIA (TELEVISION, RADIO, NEWSPAPER)
    7. BOOKS, MAGAZINES, PAMPHLETS
    8. OTHER (please explain)

    ____

33 34

35 36

37 38

22. Did you receive the pamphlet on infant nutrition produced by Saskatchewan Health "Caring is ... the right food at the right time"?

    1. YES
    2. NO (IF NO, GO TO QUESTION 26)

39

23. Did you find the information in the pamphlet "Caring is ... the right food at the right time" helpful?

    1. YES, VERY HELPFUL
    2. YES, SOMEWHAT HELPFUL
    3. NO, NOT TOO HELPFUL
    4. DID NOT READ THE PAMPHLET
    5. OTHER (please explain)

    ____

40

24. Who did you receive the pamphlet from?

    1. DOCTOR
    2. PUBLIC HEALTH NURSE
    3. NUTRITIONIST/DIETITIAN
    4. HOSPITAL
    5. OTHER (please explain) ____________

41

25. Do you have any other comments about the pamphlet "Caring is ... the right food at the right time"? ____________

    ____

42 43

26. How old are you? ____________

44 45

27. Where do you live?

    1. IN A LARGE CITY (REGINA OR SASKATOON)
    2. IN A SMALL CITY (5,000 to 50,000 people)
    3. IN A TOWN OR VILLAGE (less than 5,000 people)
    4. IN A RURAL AREA (country)

46

(OVER)

28. Which of the following is the HIGHEST level of education that you have completed?

    1. GRADE 6
    2. GRADE 8
    3. GRADE 12
    4. TECHNICAL SCHOOL
    5. SOME UNIVERSITY
    6. UNIVERSITY DEGREE
    7. DID NOT ATTEND SCHOOL
    8. OTHER (please explain) ______________________

47

29. Which of the following BEST describes your annual family income (before taxes)?

    1. UNDER $5,000
    2. $5,000 - $9,999
    3. $10,000 - $14,999
    4. $15,000 - $19,999
    5. $20,000 - $24,999
    6. $25,000 - $29,999
    7. $30,000 - $34,999
    8. $35,000 AND OVER
    9. DON'T KNOW

48 49

30. If you think there is something important about the feeding of your baby that was not asked, please tell us what it is:

____

____

____

50 51

31. Is there something about infant feeding you would like to know?

____

____

____

52 53

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE. PLEASE RETURN IT TO:

LYNN HARASYM, PROVINCIAL NUTRITIONIST
SASKATCHEWAN HEALTH
HEALTH PROMOTION DIVISION
3475 ALBERT STREET
REGINA, SASKATCHEWAN
S4S 6X6

APPENDIX C

CORRESPONDENCE

[illegible] [illegible]
[illegible]

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]
8. [illegible]

[illegible] [illegible]
[illegible]

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]
8. [illegible]
9. [illegible]

[illegible] [illegible]
[illegible]

[illegible]

[illegible] [illegible]

[illegible]

[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

Saskatchewan

Saskatchewan
Health

Community Services

3475 Albert Street
Regina, Canada
S4S 6X6

November 3, 1980

Dear Mother,

Saskatchewan Health is conducting a province-wide survey of 2,000 mothers to find out about infant feeding practices in Saskatchewan. The information obtained from this survey will be used for research purposes and to assist Saskatchewan Health in providing services and information to mothers, doctors, nurses and other health professionals in the area of infant nutrition.

We would appreciate your taking 10 minutes to complete the attached survey. Participation is voluntary. Please answer the questions about your YOUNGEST CHILD.

You will notice there is no place on the survey form for your name and address. This information is not required, and we ask that you not identify yourself on the form. Your responses will be completely anonymous and confidential. A stamped, addressed envelope is enclosed to return the survey.

When the study is completed, we would be pleased to provide you with the results so you, too, will know what and how mothers in Saskatchewan are feeding their babies. If you would like to receive a copy of the results or information on infant nutrition, please fill in the card included for this purpose. Please send it separately from the survey to Saskatchewan Health.

Thank you for your time and participation.

Sincerely,

Lynn Harasym

Lynn Harasym
Provincial Nutritionist
Health Promotion Division

Saskatchewan

Saskatchewan
Health

Community Services

3475 Albert Street
Regina, Canada
S4S 6X6

November 10, 1980

Dear Mother,

Saskatchewan Health is conducting a province-wide survey of 2,000 mothers to find out about infant feeding practices in Saskatchewan. The information obtained from this survey will be used for research purposes and to assist Saskatchewan Health in providing services and information to mothers, doctors, nurses and other health professionals in the area of infant nutrition.

We would appreciate your taking 10 minutes to complete the attached survey. Participation is voluntary. Please answer the questions about your YOUNGEST CHILD.

You will notice there is no place on the survey form for your name and address. This information is not required, and we ask that you not identify yourself on the form. Your responses will be completely anonymous and confidential. A stamped, addressed envelope is enclosed to return the survey.

When the study is completed, we would be pleased to provide you with the results so you, too, will know what and how mothers in Saskatchewan are feeding their babies. If you would like to receive a copy of the results or information on infant nutrition, please fill in the card included for this purpose. Please send it separately from the survey to Saskatchewan Health.

Thank you for your time and participation.

Sincerely,

Lynn Harasym

Lynn Harasym
Provincial Nutritionist
Health Promotion Division

Dear Mother:

Two weeks ago, you received a survey concerning infant feeding practices. This is just a reminder to ask your help in completing and returning that survey. If you have already done so, thank you. If not, your reply is needed to help us complete this project.

If you have lost or misplaced your survey form, please call me collect at 565-3079, and I will gladly send you a second copy.

Thank you for your co-operation.

Lynn Harasym
Provincial Nutritionist
Saskatchewan Health
Health Promotion Division
3475 Albert Street
Regina, Saskatchewan, S4S 6X6

Please send me:

( ) A COPY OF THE RESULTS

( ) INFORMATION ON INFANT NUTRITION

( ) IS THERE SOMETHING ABOUT INFANT NUTRITION YOU WOULD LIKE TO KNOW: ______________________________

____

____

My name and address are:

NAME: ______________________

ADDRESS ______________________

CITY ______________________

POSTAL CODE ______________________

LYNN HARASYM, PROVINCIAL NUTRITIONIST
SASKATCHEWAN HEALTH
HEALTH PROMOTION DIVISION
3475 ALBERT STREET
REGINA, SASKATCHEWAN
S4S 6X6

APPENDIX D

DATA BY HEALTH REGION

TABLE 1D*

Sample Distribution by Health Region

Health Region**	Number of Questionnaires	Percentage of Total Sample
Regina	211	20.6
Saskatoon	204	19.9
Melfort/Tisdale	84	8.2
Moose Jaw	78	7.6
Prince Albert	72	7.0
Regina Rural	61	5.9
Yorkton/Melville	57	5.6
North Battleford	57	5.6
Swift Current	54	5.3
Rosetown	52	5.1
Saskatoon Rural	47	4.6
Weyburn/Estevan	38	3.7
DNS	9	0.9
Total	1024	100.0

* Health Regions could only be identified on 1024 of the questionnaires, therefore, these results are based on 76.3% of the study sample.

** Listed by decreasing percentage of representation.

TABLE 2D*

Incidence of Breastfeeding by Health Region

Health Region**	Total Number of Mothers	Number of Breastfeeders	Percentage
Melfort/Tisdale	84	70	83.3
Prince Albert	72	60	83.3
Yorkton/Melville	57	47	82.5
Saskatoon Rural	47	38	80.8
Saskatoon	204	164	80.4
Moose Jaw	78	61	78.2
DNS	9	7	77.8
Regina	211	157	74.4
Swift Current	54	40	74.1
Regina Rural	61	45	73.8
North Battleford	57	41	71.9
Rosetown	52	37	71.1
Weyburn/Estevan	38	24	63.2
Total	1024	791	77.2

* Health Regions could only be identified in 1024 of the questionnaires, therefore, these results are based on 76.3% of the study sample.

** Listed by decreasing percentage of incidence of breastfeeding.

TABLE 3D*

Age of Introduction of Solid Food by Health Region

Health Region**	Introduction Age Before 6 wks	6 wks - 3 mos	After 3 mos	Total
	number (%)	number (%)	number (%)	number (%)
DNS	0 (0.0)	2 (50.0)	2 (50.0)	4 (0.6)
North Battleford	13 (31.7)	9 (21.9)	19 (46.3)	41 (5.7)
Saskatoon	40 (29.0)	39 (28.3)	59 (42.7)	138 (19.3)
Melfort/Tisdale	15 (24.2)	23 (37.1)	24 (38.7)	62 (8.6)
Prince Albert	11 (25.0)	16 (36.4)	17 (38.6)	44 (6.1)
Moose Jaw	18 (31.6)	18 (31.6)	21 (36.8)	57 (8.0)
Regina Rural	19 (41.3)	12 (26.1)	15 (32.6)	46 (6.4)
Rosetown	19 (47.5)	9 (22.5)	12 (30.0)	40 (5.6)
Saskatoon Rural	17 (48.6)	8 (22.9)	10 (28.6)	35 (4.9)
Weyburn/Estevan	12 (54.6)	4 (18.2)	6 (27.3)	22 (3.1)
Regina	51 (35.9)	53 (37.3)	38 (26.8)	142 (19.8)
Yorkton/Melville	16 (38.1)	16 (38.1)	10 (23.8)	42 (5.9)
Swift Current	18 (41.9)	18 (41.9)	7 (16.3)	43 (6.0)
Total	249 (34.8)	227 (31.7)	240 (33.5)	716(100.0)

* Results for this table are based on 76.2% of the 940 mothers who indicated they were feeding their infants solid food.

** Listed in decreasing percentage of introduction of solids after 3 months (3rd column).

The underlined figures and percentages indicate the most frequent introduction age in each Health Region.

TABLE 4D*

Food Preparation by Health Region

Health Region**	Homemade	Commercial	Total
	number (%)	number (%)	number (%)
Yorkton/Melville	30 (76.9)	9 (23.1)	39 (6.2)
Melfort/Tisdale	43 (72.9)	16 (27.1)	59 (9.5)
Rosetown	21 (70.0)	9 (30.0)	30 (4.8)
Saskatoon Rural	21 (67.7)	10 (32.3)	31 (5.0)
Moose Jaw	32 (66.7)	16 (33.3)	48 (7.7)
Weyburn/Estevan	12 (66.7)	6 (33.3)	18 (2.9)
DNS	2 (66.7)	1 (33.3)	3 (0.5)
Regina	77 (63.1)	45 (36.9)	122 (19.6)
Swift Current	23 (59.0)	16 (41.0)	39 (6.2)
Prince Albert	20 (54.0)	17 (46.0)	37 (5.9)
Saskaton	63 (53.4)	55 (46.6)	118 (18.9)
North Battleford	20 (51.3)	19 (48.7)	39 (6.2)
Regina Rural	21 (51.2)	20 (48.8)	41 (6.6)
Total	385 (62.0)	239 (38.0)	624(100.0)

* Results reported in this table are based on 76.6% of the 815 mothers who indicated how they prepared their infant's food.

** Listed in decreasing percentage of homemade baby food.

APPENDIX E

SUPPLEMENTARY TABLES

TABLE 1E

Summary of First Level Chi-Square Analysis Between Selected Variables

Variables	Chi-Square Value	Degree of Freedom	p	Significance
Incidence of Breastfeeding				
Mother's Education Level	68.24	6	.0001	*
Prenatal Class Attendance	34.35	1	.0001	*
Parity	15.53	1	.0001	*
Breastfeeding Experience	90.74	1	.0001	*
Rooming-In Practice	53.16	4	.0001	*
Family Income Level	6.90	2	.0318	NS
Mother's Age	6.39	4	.1718	NS
Place of Residence	3.51	2	.1729	NS
Infant Sex	3.84	1	.0502	NS
Duration of Breastfeeding				
Mother's Education Level	34.26	6	.0001	*
Mother's Age	16.48	4	.0024	*
Parity	8.72	1	.0031	*
Breastfeeding Experience	23.48	1	.0001	*
Family Income Level	5.76	3	.1238	NS
Place of Residence	5.88	2	.0528	NS
Prenatal Class Attendance	0.13	1	.7172	NS
Infant Sex	0.13	1	.7208	NS
Rooming-In Practice	8.22	4	.0839	NS
Age of Introduction of Solid Food				
Family Income Level	14.44	4	.0060	*
Mother's Education Level	50.40	12	.0001	*
Mother's Age	23.07	8	.0033	*
Breastfeeding Experience	17.42	2	.0002	*
Duration of Breastfeeding	14.58	2	.0007	*
Type of Milk Feeding	13.72	2	.0001	*
Place of Residence	5.75	4	.2188	NS
Prenatal Class Attendance	7.12	2	.0285	NS
Parity	0.12	2	.9426	NS
Infant Sex	0.09	2	.9585	NS

* $p < .01$

TABLE 2E

Summary [illegible] Second Level Chi-Square Analysis Between Selected Variables

Variables	Chi-Square Value	Degree of Freedom	Significance	Table
Incidence of Breastfeeding				
Mother's Education Level	55.38	1	*	4E
Rooming-In Practice	0.68	1	NS	-
Duration of Breastfeeding				
Mother's Education Level	24.27	1	*	5E
Mother's Age	14.27	1	*	6E
Age of Introduction of Solids				
Mother's Education Level	65.10	1	*	8E
Mother's Age	12.70	1	*	9E
Breastfeeding Experience	13.32	1	*	10E
Breastfeeding Duration	13.98	1	*	11E
Type of Milk Feeding	26.71	1	*	12E

* $p < .01$

TABLE 3E

Infant Sex, Parity, and Place of Residence: A Comparison of the Study Sample and the Saskatchewan Population

Variable	Groups	Study Sample	Saskatchewan Population
Infant Sex	Male	52.4%	51.3%*
	Female	47.6%	48.7%
Parity	Primipara	34.3%	39.8%*
	Multipara	65.7%	60.2%
Place of Residence	Urban	51.3%	46.1%**
	Rural	48.7%	53.9%

* Source: Saskatchewan Health Vital Statistics, Annual Report 1977, Regina

** Statistics Canada: Population: Geographic Distribution, 1976, Ottawa

TABLE 4E

Incidence of Breastfeeding by Mother's Education Level

Education Level	Total Number of Mothers	Breastfeeders	
		Number	Percentage
Grade 12 or Less	697	482	69.6
Post-Secondary Education	638	551	86.4
Total	1335	1033	77.4

Calculated $x^2 = 55.38$, df = 1, $p < .01$

This table presents the results of the secondary chi-square analysis using dichotomous groups for mother's education level. Table 16 in the text shows the detailed results of the initial chi-square calculation.

TABLE 5E

Duration of Breastfeeding by Mother's Education Level

Education Level	Breastfeeding	Discontinued	Total
	number (%)	number (%)	number (%)
Grade 12 or Less	228 (45.1)	278 (54.9)	506 (47.7)
Post-Secondary Education	335 (60.4)	220 (39.6)	555 (52.3)
Total	563 (53.1)	498 (46.9)	1061(100.0)

Calculated $x^2 = 24.27$, df = 1, $p < .01$

This table presents the results of the secondary chi-square analysis using dichotomous groups for mother's education level. Table 22 in the text shows the detailed results of the initial chi-square calculations.

TABLE 6E

Duration of Breastfeeding by Mother's Age

Mother's Age	Breastfeeding	Discontinued	Total
	number of mothers (%)	number of mothers (%)	number of mothers (%)
Less than 25 years	177 (45.4)	213 (54.6)	390 (36.7)
25 years or older	387 (57.6)	285 (42.4)	672 (63.3)
Total	564 (53.1)	498 (46.9)	1062(100.0)

Calculated $x^2 = 14.27$, df = 1, $p < .01$

This table presents the results of the secondary chi-square analysis using dichotomous groups for mother's education level. Table 23 in the text shows the detailed results of the initial chi-square calculations.

TABLE 7E

Age of Introduction of Solid Food by Mother's Education Level

Education	Introduction Age ≤3 months	 >3 months	Total
	number (%)	number (%)	number (%)
Grade 12 or Less	385 (73.2)	141 (26.8)	526 (56.3)
Post-Secondary Education	236 (57.7)	173 (42.3)	409 (43.7)
Total	621 (66.4)	314 (33.6)	935(100.0)

Calculated $x^2 = 65.10$, df = 1, $p < .01$

This table presents the results of the secondary chi-square analysis using dichotomous groups for mother's education level and the age of solid introduction. Table 37 in the text shows the detailed results of the initial chi-square calculations.

TABLE 8E

Age of Introduction of Solid Food by Mother's Age

Mother's Age	Introduction Age ≤3 months	 >3 months	Total
	number (%)	number (%)	number (%)
Less Than 25 Years	260 (73.7)	93 (26.3)	353 (37.8)
25 Years or Older	360 (62.1)	220 (37.9)	580 (62.2)
Total	620 (66.5)	313 (33.5)	933(100.0)

Calculated $x^2 = 12.70$, df = 1, $p < .01$

This table presents the results of the secondary chi-square analysis using dichotomous groups for mother's age level and the age of solid introduction. Table 38 in the text shows the detailed results of the initial chi-square calculations.

TABLE 9E

Age of Introduction of Solid Food by Breastfeeding Experience

Breastfeeding Experience	Introduction Age $\leq$3 months	 $>$3 months	Total
	number (%)	number (%)	number (%)
Experience	245 (59.9)	164 (40.1)	409 (43.7)
No Experience	376 (71.5)	150 (28.5)	526 (56.3)
Total	621 (66.4)	314 (33.6)	935(100.0)

Calculated $x^2 = 13.32$, df = 1, $p < .01$

This table presents the results of the secondary chi-square analysis using dichotomous groups for the age of introduction of solid food. Table 39 in the text shows the detailed results of the initial chi-square calculations.

TABLE 10E

Age of Introduction of Solids and the Duration of Breastfeeding

Duration of Breastfeeding	Introduction Age $\leq$3 months	 $>$3 months	Total
	number (%)	number (%)	number (%)
Still Breastfeeding	137 (52.9)	122 (47.1)	259 (36.4)
Discontinued	305 (67.3)	148 (32.7)	453 (63.6)
Total	442 (62.1)	270 (37.9)	712(100.0)

Calculated $x^2 = 13.98$, df = 1, $p < .01$

This table displays the results of the secondary chi-square analysis using two introduction age groups. Table 40 in the text shows the detailed results of the initial chi-square calculation.

TABLE 11E

Age of Introduction of Solids and Type of Milk Feeding

Type of Milk Feeding	Introduction Age ≤ 3 months	 >3 months	Total
	number (%)	number (%)	number (%)
Breastfeeding	118 (52.2)	108 (47.8)	226 (24.1)
Other Forms	505 (71.1)	205 (28.9)	710 (75.9)
Total	623 (66.6)	313 (33.4)	936(100.0)

Calculated $x^2 = 26.71$, df = 1, $p < .01$

This table displays the results of the secondary chi-square analysis using dichotomous groups for the age of introduction of solids. Table 41 in the text shows the detailed results of the initial chi-square calculations.

TABLE 12E

Salt and Sugar Additions to Infant Food

Additive	Type of Food	Frequency	Percentage*
Salt	Vegetables	96	59.6
	Other	79	49.1
	Meat or Fish	50	31.0
	Cereal	10	6.2
	Eggs	10	6.2
Total number of mothers adding salt		161 of 890	18.1%
Sugar	Cereal	186	74.1
	Water	46	18.3
	Eggs	21	8.4
	Vegetables	20	8.0
	Fruit	3	1.2
	Other	1	0.4
Total number of mothers adding sugar		251 of 924	27.2%

* Percentage columns do not add up to 100.0 because some mothers were adding salt or sugar to more than one food.

TABLE 13E

Type of Supplementation by Infant Age

Supplementation	Infant Age 6 weeks	 3 months	 6 months	 12 months
	number (%)	number (%)	number (%)	number (%)
Trivisol	115 (60.1)	143 (62.4)	133 (51.1)	91 (38.6)
Triviflor	49 (25.9)	45 (19.7)	69 (26.5)	71 (30.1)
Ostoco	13 (6.9)	13 (5.7)	15 (5.8)	19 (8.1)
Polyvisol	7 (3.7)	11 (4.8)	16 (6.2)	15 (6.4)
Iron	6 (3.2)	13 (5.7)	26 (10.0)	17 (7.2)
Polyviflor	3 (1.6)	12 (5.2)	16 (6.2)	12 (5.1)
Fluoride	2 (1.1)	6 (2.6)	7 (2.7)	10 (4.2)
Other	5 (2.6)	8 (3.5)	9 (3.5)	30 (12.7)
Total Number of Infants Receiving Supplementation	189	229	260	236

Note: Number columns do not add up to total number of infants in each category and percentage columns do not add up to 100.0% because respondents could indicate more than one supplementation.

TABLE 14E

Type of Supplementation by Type of Milk Feeding

Type of Supplement	Type of Milk Feeding								Total
	Breastmilk	Commercial Formula	Home-Prepared Formula	Mod. Comm. Formula	Whole Milk	2% Milk	Skim Milk	Goat Milk	
Fluoride	12	3	0	0	3	5	1	0	24
Iron	30	9	1	1	8	11	0	0	60
Trivisol	206	111	7	9	74	72	1	2	482
Triviflor	88	40	1	10	57	37	0	0	234
Polyvisol	17	10	0	1	13	9	0	0	50
Polyviflor	19	9	1	1	8	5	0	0	43
Ostoco	21	16	2	1	16	4	0	0	60
Other	7	12	1	2	14	15	1	0	52
Total number of infants receiving:									
1 supplement	359	194	12	23	181	138	3	2	912
2 supplements	39	13	1	2	12	19	0	0	86
3 supplements	2	3	0	0	0	2	0	0	7
Total number of supplements	400	210	13	25	193	159	3	2	1005

APPENDIX F

MOTHERS' COMMENTS AND QUESTIONS

TABLE 1F

Topics on Which Mothers Wanted More Information

- colic
- how foods affect babies
- more about vitamins and minerals for the first few months
- milk feedings
- recipes
- fussy eaters
- harmful foods
- allergies
- bottlefeeding
- health foods for baby
- foods mother eats that affect milk
- fruits and vegetables (how to prepare)
- amounts of milk
- weaning
- when to give juices
- goat milk as an alternative
- milk substitutes
- formulas and their preparation
- breastfeeding slowdown at three months